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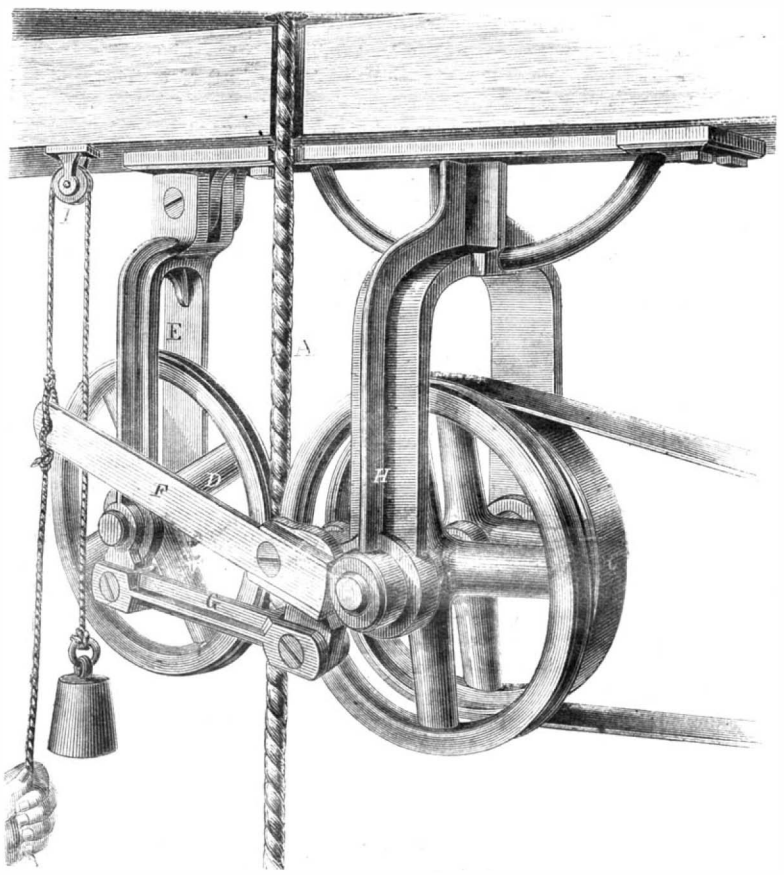
Improved Hoisting Machine.

In all hatchways where goods are hoisted and lowered by the common wheel and axle, manual power is employed. Whether the articles be light or heavy, nearly the same time is required to lift them, for the hatchway is generally so high that the speed the men work at must be moderate, or time taken for rest. This machine is intended to apply to all ordinary hoistways where steam power can be made available, either from the same building or an adjoining one. Its construction is so simple that it cannot possibly get out of order, and enables it to be sold at the very low price of fifty dollars. It can be placed on any floor of the building, and is operated from either above or below with equal facility. If at any time it is desired to use the hoistway by hand, it can be done as readily as before, as the machine does not interfere with the working of it in the least. The details are as follows:—



MARVIN'S HOISTING MACHINE.

The shaft of the grooved pulley, B, has a belt wheel, C, which is to be driven by power derived from any convenient source. In the same bed plate is another grooved pulley, D, working on a shaft in the jointed hanger, E, said hanger being connected by lever, F, and bar, G, to the hanger, H. From the end of the lever, F, a rope passes up over a pulley, I, the end passing down through the floor as far as may be desired. A rope also passes up to the top of the building. As the grooved pulley, B, is constantly revolving, whenever the rope is drawn tight, it pulls the grooved pulley, D, into contact with the grooved pulley, B, pressing the rope, A, between them and thereby forcing it downward. It can easily be held in gear by one hand, and raises goods very rapidly. When the rope is released the weight immediately throws it out of gear. The grooved pulleys are covered with vulcanized rubber so that with very little power a great deal of friction is obtained, and it does not wear the rope in the least. It can be put up by any one in less than an hour.

Parties interested can do well to examine this machine. Manufactured and for sale by Marvin & Co., No. 265 Broadway, New York.

Inspiring of Air.

The following interesting results were obtained from the experiments of Dr. Edward Smith on the quantity of air inspired throughout the day and night under various influences. The total quantity of air inspired in twenty-four hours, allowance being made for intervals amounting to 40 min., during which records were not taken, was 711,000 cubic inches; or an average of 29,627 cubic inches per hour, and 493·6 per minute. The quantity was much less during the night than during the day. There was an increase as the morning advanced, and a decrease at about 8.30 P.M., but most suddenly at about 11 P.M. The average depth of respiration was 25·6 cub. inches, with a minimum of 18· cub. inches in the night, and a maximum of 32·2 cub. inches at 1.30 P.M. The mean rate of the pulse was 76 per minute. The amount of breathing was greater in the standing than in the sitting posture. It was increased by riding on horseback, according to the pace, also by riding in or on an omnibus. In railway traveling the increase was greater in a second than in a first-class carriage, and greater in the third class and on the engine. Bending forward while sitting lessened it. The quantity of inspired air was increased by exposure to the heat and light of the sun, and lessened in darkness. When tea was taken an increase was the result; coffee caused a decrease. Supper of bread and milk also caused a decrease, but milk by itself or with suet caused an increase. An increase was obtained with the following articles of diet, viz., eggs, beef steak, jelly, white bread, oatmeal, potatoes, sugar, tea, rum. The following caused a decrease, viz., butter, fat of beef, olive oil, cod-liver oil, arrowroot, brandy, and kirchenwasser.

Photography in Colors.

The old year has passed away, having recorded in its last weeks another important discovery of M. Poitevin. This is nothing less than *the production of photographs in their natural colors on paper*. Hitherto these colored pictures have been produced by a few scientific experimenters upon silver plates alone; now a simple process is published by which any one conversant with ordinary photographic manipulation may obtain veritable helio-chromographs. M. Edmund Becquerel was good enough to inform me that this important step in his own discoveries of 1848 was about to be communicated by him, on behalf of M. Poitevin, to the *Academie des Sciences;* and I have had an opportunity of examining these remarkable pictures, and seeing them in process of printing, through the kindness of M. Poitevin himself. The paper upon which they are taken is prepared with the subchloride of silver, and presents the appearance of sensitized plain paper which has been exposed to the light. This paper is brushed over with a solution, composed of equal parts of—

Saturated solution of bicromate of potash,
Saturated solution of sulphate of copper,
Solution of chloride of potassium (twenty grains to the ounce).

When dry this paper will remain sensitive in the dark for several days. It is not sufficiently sensitive to be employed in the camera, but can be used for obtaining pictures in an enlarging apparatus. To obtain a colored picture, expose a sheet of this sensitized paper under a transparent colored print or painting (a sheet of varnished diaphanie answers the purpose) during five or ten minutes, according to the light, the transparency of the negative, etc. The progress of the print can be watched as with ordinary photographs, the colors being produced as the printing process goes on. To fix these prints wash them in water acidulated with chromic acid, then with water containing bichloride of mercury, then with a weak solution of nitrate of lead, and finally in distilled water to remove all soluble matter. Like their elder relations, the helio-chromographs on silver plates, they can only at present be preserved in diffused light; they become brown from exposure to direct sunlight. However, they can be kept in albums, or even hung in sooms, if not exposed to strong light. M. Poitevin suggested to me that if a negative, which was intended to be used to obtain an enlarged print, be carefully colored in pure transparent colors, the resulting enlargement printed by this process would exhibit the colors of the negative. Although the colors of these photographs are not quite so brilliant as those on silver plates, as might be expected from the difference of the sensitive surfaces, the pictures are very good; and photography in natural colors will, I think, receive such an impetus by this discovery that the boldest hopes of its disciples will be realized sooner than they have expected.

When I found how the pictures were produced, I instantly thought of forming a violet subchloride of silver in collodion films on glass as a means of obtaining helio-chromographic negatives. The simultaneous action of light and oxidizing agents on violet subchloride is to "bleach" instead of blacken; hence an ordinary negative would yield a negative picture on the subchloride of silver paper, white light producing a white color. In the sensitizing mixture the bichromate of potash is the principal agent; it may be replaced, but without advantage, by chromic acid. The sulphate of copper facilitates the reaction, and the chloride of potassium preserves the whites when they are formed.

It may be interesting to observe that the method adopted by M. Edmund Becquerel for obtaining naturally-colored photographs and that of M. Poitevin are similar in principle.—*Correspondence British Journal of Photography.*

An artificial cave has been discovered in Lookout Mountain, Ga., and explored for a distance of 175 feet. Various Indian relics were discovered, and the place is thought to have been a refuge for Indians in former times.

ARAGO'S PLAN FOR PROVING THE TRUE THEORY OF LIGHT.

Among the papers published in the Smithsonian Report is a translation by Alfred M. Mayer, Professor of Physics, Pennsylvania College, Gettysburg, of a very clear essay on the velocity of light, by M. Delaunay, of the Institute of France. From this translation we extract the following account of the plan proposed by M. Arago for determining experimentally the long dispnted question whether light is an emission or an undulation. Arago's eyesight being impaired, he was unabled to try the experiment himself, but in 1850 the trial was made by M. Faucault, also by MM. Fijeau and Bregnet, these *gentlemen* having first obtained the assent of Arago, before proceeding with an experiment suggested by him.

The first step in this direction was the most difficult to make, and it required all the daring of genius to attempt it. We find it in an experiment projected by Arago, and communicated to the Academy of Sciences of Paris during its meeting on the 3d of December, 1838. In the project it was not as yet proposed to measure the velocity of light, but simply to compare the velocities with which light moves in air, or in a liquid such as water, or bisulphide of carbon; it was proposed to find by experiment which of these two velocities was the greater, which would decide in an irrefutable manner between the two systems imagined by physicists to explain optical phenomena, viz:—the system of emission and that of vibration or undulation. We cannot do better than here allow Arago to speak for himself. The following is what he says in the notice printed in the proceedings of the meeting:—

"I propose to show in this communication how it is possible to decide, unequivocally, whether light be composed of little particles emanating from radiating bodies, as Newton supposes, and as the greater part of modern geometers admit; or whether it is simply the result of the undulations of a very rare and very elastic medium which physicists have agreed to call *ether*. The system of experiments which I am about to describe will no longer permit, it seems to me, to hesitate between these two rival theories. It will decide *mathematically*, (I use designedly this expression); it will decide mathematically one of the grandest and most debated questions of natural philosophy.

"Besides, my communication is the fulfilling of a sort of engagement to the Academy I accepted at one of its last secret sittings.

"I discussed the admirable method, by the aid of which Mr. Wheatstone attempted the solution of the problem of the velocity of electricity over metallic conductors. I had hardly terminated the enumeration of the important results obtained by that ingenious physicist, when several of our members, whose names are authority in such matters, stated that my report was far too approbative. 'In supposing it well determined, the inferior limit assigned by Mr. Wheatstone to the velocity of electricity will not have,' said one, 'any marked influence on the progress of the sciences; besides, limits of the same order, and even more extensive, can be deduced indirectly from various electric or magnetic phenomena. As to the method of the revolving mirrors, it does not seem to be susceptible of application, but to the simple questions already studied by the inventor.' I tried to refute this last opinion. I believe myself that the new instrument, suitably modified, would lead to results that Mr. Wheatstone was not aware of. I already foresaw that, even in supposing it inclosed in the narrow limits of a small room, it could serve to measure the comparative velocities of light moving through air and through a liqnid. I was not slow in learning, and without having hardly the right to be astonished or to complain that my assertions had been received with incredulity. Nevertheless, I intend to vindicate it today in all its parts.

"Principle of the method:—Let a ray of light fall upon a plane polished mirror; it will be reflected, as every one knows, in forming with the surface of the mirror an angle of reflection exactly equal to the angle of incidence.

"Let us now suppose that the mirror turns through an arc, a, around the point of its surface from which the reflection takes place. If this motion, for example, increases the quantity, a, *the original angle of incidence*, it will diminish as much *the original angle of reflection*. The latter will, therefore, after the displacement of the mirror, be smaller than the first by the quantity $2a$; thus it must be increased $2a$ to render it equal to *the new angle of incidence;* hence that angle increased $2a$ will give the direction of the reflected ray in the second position of the mirror; and thus the incident ray remaining the same, an angular motion, a, of the mirror occasions a *double* angular motion in the reflected ray.

"This mode of reasoning applies as well to the case where the motion of the mirror, acting in a contrary direction, would *diminish* the first angle of incidence. The principle is, therefore, general; and it is also that of all reflecting nautical instruments.

"The reflection from the plane mirrors can serve to project the luminous rays in all parts of space, without, however, altering the relative positions; two rays parallel before reflection; those at first inclined to each other 1 minute, 10 minutes, or 20 minutes, etc., will form precisely the same angle after the reflection has deviated them.

"Instead of a single ray, let us consider two horizontal rays setting out from *two neighboring* points situated in the same vertical. Admit that they strike on two points of the median line (also vertical) of a plane vertical mirror. Suppose that this mirror revolves on itself uniformly and in a continuous manner aronnd a vertical axis whose prolongation coincides with the median line just mentioned, the direction in which the two horizontal lines will be reflected will depend evidently upon the moment they may reach the mirror, since we have snpposed that it turns. If the *two rays* have *set out simultaneously from the two contiguous points*, they will also reach simultaneously by the mirror. Their reflection will take place at the *same instant;* consequently in the same position of the turning surface; consequently as if that surface was stationary with respect to them. Therefore their primitive parallelism will not be changed.

"In order that the rays which primitively were parallel may diverge after their reflection, it is necessary that one of them should arrive at the mirror later than the other. It is necessary that in its course from the radiating point to the reflecting and turning snrface, the velocity of the ray should be accelerated, or what will be precisely the same thing, it is necessary (the velocity of the first ray remaining constant) that that of the second should experience a diminution. It is necessary, finally, that the two rays should be reflected one after the other; and, consequently, from two distinct positions of the mirror, forming with each other a sensible angle.

"According to the theory of emission, light moves in water notably faster than in air. According to the wave theory, it is precisely the opposite which takes place: the light moves faster in air than in water. Suppose that one of the rays (the upper ray for example) has to traverse a tube filled with water before it strikes the mirror. If the theory of emission be true, the upper ray will be accelerated in its progress; it will reach the mirror first; it will be reflected before the lower ray; it will make with it a certain angle, and the direction of the deviation will be such that the lower ray will appear in advance of the other, that it will appear to have been deviated more by the turning mirror.

"Circumstances remaining the same, let us admit for a moment the truth of the wave system. The tube of water will retard the progress of the upper ray; the ray will arrive at the reflecting mirror after the lower ray; it will be reflected not the first, as in the former case, but the second in order, and from a position of the polished reflecting face in advance of the position it had when it reflected the npper ray a moment before; these two rays will make with each other the same angle as in the other hypothesis, except (and we should well remark it) the deviation will take place precisely in an opposite direction; the upper ray will now be in advance, always indicating thus the direction in which the mirror revolves.

"To recapitulate: two radiating points, placed near each other on the same vertical line, flash instantaneously before a revolving mirror. The rays from the upper point cannot reach the mirror until after traversing a tube filled with water; the rays from the second point arrive at the mirror without meeting in their course any other medium than air To be more definite, we will suppose that the mirror, seen from the position the observer occupies, turns from the right to the left. Well, if the theory of emission be true; if light be material, the upper point will *appear to the left* of the lower point. *It will appear to the right*, on the contrary, if light results from the vibrations of an ethereal medium.

"Instead of two isolated radiating points, suppose that we instantaneously present to the mirror a vertical luminous line. The image of the upper part of this line will be formed by rays which have traversed the water; the image of the lower part will result from the rays which have throughout their whole course traversed the air. In the revolving mirror the image of the single line *will appear broken;* it will be composed of *two* vertical luminous lines, of two lines, which will not be prolongations of each other.

"The upper rectilinear image, is it behind the one below? Does it appear to the left?

"*Light is a body.*

"Does the contrary take place? The upper image, does it show itself to the right?

"*Light is an undulation.*

"All that procedes is theoretically, or rather speculatively exact. Now (and here is the delicate point), it remains to prove that, notwithstanding the prodigious velocity of light, that notwithstanding a velocity of 190,000 miles a second, that notwithstanding the small length that we will be obliged to give to the tube filled with liquid, that notwithatanding the limited velocities of rotation that the mirrors will have, the comparative deviations of the two images, toward the right or toward the left, of which I have demonstrated the existence, will be perceptible in our instruments."

Arago then enters into the most minute details of all the parts of the experiment—the velocity of rotation that can be given to a mirror, the visibility of the image formed by light after having traversed the necessary length of liquid, the posibility of reducing that length of liquid, or the velocity of rotation of the mirror by employing simultaneously several rotating mirrors from which the light would be successively reflected, and also in substituting for water bisulphide of carbon, which acts more powerfully on the velocity of light, are, on his part, the object of a thorough examination. He then terminates thus:—

"Suppose in the experiment that I propose to execute we make use of electric sparks, or of lights sucessively screened and unscreened by the use of rotating disks, as their emissions should only last during a few thousandths of a second, it may happen that an observer, looking in the mirror from a given direction, and with a telescope of limited field, will only by chance perceive the light. To this I immediately reply that in renewing very often the apparitions of light—every second, for example—that if, instead of a single mirror, we rotate a vertical prism of eight or ten facets, that with the concurrence of several observers, placed in different directions, and each with his telescope, we cannot fail to have numerous and clear apparitions of the reflected rays. But these are details on which I shall not dwell today. I will reserve for another communication the exposition of the system of experiments in which we will render sensible, and in which we will measure, to a certain degree, the *absolute velocity* of light without having recourse to celestial phenomena."

Before proceeding further in the perusal of the essay of M. Delaunay, it is necessary that all who have not given especial attention to the study of recent optical research, and who desire to appreciate the beauty and importance of the remainder of this essay, should understand *why* light should move faster in water than in air according to the emission theory, and slower in water than in air according to the undulatory theory. This is not explained by the author, and without this knowledge it is impossible to appreciate the excellence of these classical experiments of Arago, of Fizeau, and of Foucault.

We would advise the above class of readers to study the points here spoken of in the "Lectures on the Undulatory Theory of Light," by Professor Banard, Smithsonian Report for 1862. In the admirable "*Traite de Physique*," by Daguin, Paris, 1862, and in Pouillet's "*Trait de Physique*," will be found detailed accounts of the apparatus mentioned in this essay, illustrated with engravings. The origina

memoirs in the transaction of the Academy of Sciences of Paris should also be continued.

RECENT AMERICAN PATENTS.

Marking Wheel.—This invention consists in a revolving type wheel arranged in a suitable handle in combination with an ink roller, in such a manner that by carrying the type wheel over the cover of a bed, or over any other surfaces, the types on the wheel produce an impression, and the marking of a box or other article can be effected neatly and distinctly with little loss of time. The ink roller is composed of a hollow cylindrical reservoir perforated with small holes, and surrounded by a strip of cloth or other absorbent material, so that the same is capable of holding a supply of ink for a large number of impressions. The type wheel is provided with yielding rims or flanges made of india-rubber or other elastic material, so that the types can be depressed on the surface to be marked with the requisite force to produce the desired impression, and a coiled or other spring is applied to said type wheel, in such a manner that it carries the same back after each impression to the starting point, and thereby the types are brought in contact with the ink rollers and supplied with the requisite quantity of ink for the subsequent impression; and, furthermore, the type wheel readjusts itself in the required position for starting. Horace Holt, of No. 264 Broadway, New York, is the inventor.

Checking the Recoil and Operating and Pointing Cannon.—Much time is lost in the ordinary method of controlling, by means of friction, the recoil of heavy guns, in consequence of the time consumed in tightening and relieving the compressors which produce the required friction. Much danger is also incurred in working heavy guns on board of ships during bad weather at sea because the compressors must be relieved in order to roll the gun out after being loaded. Any sudden lurch of the vessel while the compressers are thus relieved, renders the gun uncontrollable, and endangers the lives of the gunners as well as the safety of the gun and carriage. Much difficulty and danger are also experienced in training or pointing heavy guns on board of ships, particularly during bad weather. The object of this invention is to overcome the difficulties thus enumerated. In order to save the time lost in tightening and relieving the present friction gear of gun carriages, a rotary compressor is employed, kept under constant pressure, composed of a series of circular metallic disks secured to an axle which passes through the side frames of the gun carriage, this axle having attached to it pinions, the teeth of which work into toothed racks bolted to the inside of the gun slides. Between the metallic disks are inserted wooden ones fixed within a cylindrical box made of brass or iron, the circumference of which is provided with cogs. Into this toothed cylindrical box wheel is geared a pinion, which, by means of suitable hand gear, enables the gunners to run the gun in and out; and by it the box wheel may also be instantly locked, and the movement of the gun carriage thereby checked at any time. The training or pointing the gun is effected by means of a toothed rack attached to the slides upon which the gun carriage moves, said rack being actuated by a pinion attached to the lower end of a vertical shaft which the gunners turn round by means of winches and cog wheels. John Ericsson, of New York City, is the inventor.

Wood-tenoning Machine.—This invention consists in so arranging the cutter heads of a wood-tenoning machine, that while they can be adjusted with regard to each other, to any thickness of tenon which it is desired to form, they can be, after such adjustment, brought to any position with regard to the end of the board or plank upon which they are to operate without disturbing their relative position with regard to each other, as previously adjusted. H. B. Smith, of Lowell, Mass., is the inventor.

Glass Mold Board for Plows.—Messrs. O. F. Burton, of this city, and L. B. Hoit, of Cedar Falls, Iowa, obtained a patent through this office, on the 9th inst., for making mold boards for plows, of glass! The idea is quite novel, but we are told that on the prairies they have been tested with the best practical results.

PATENT-OFFICE DECISIONS.

Application for patent for improvement in steel-facing vises and various other articles of iron.

S. C. Fessenden, for the Board.—The applicant says:—"I do not claim the brazing process of itself; neither do I claim the hardening of steel by heating it, and subsequently suddenly cooling it. But what I do claim as my invention is, the combination of the two processes of brazing and hardening the piece of steel, or facing, with that of so firmly holding the facing piece of steel to the iron while the hardening process is being carried on, as to prevent the displacement or escape of the brazing metal from between the contiguous surfaces against which it may be." The Examiner rejects the application; first, on the ground that the specification presents no patentable feature; and second, that the patent already granted to the applicant, No. 44,739, covers all the improvements which he claims.

We have compared the Letters Patent, No. 44,739, with the application now under consideration, and we fail to perceive that the specification in said application is similar to any specification in the former Letters Patent, and for which the patent was issued. It is well put, that, in the Letters Patent, the invention covered consisted in brazing and hardening the steel under one and the same heating of it, such as may be requisite for effecting the melting of the brazing metal to accomplish the brazing.

In the new process, the tempering of the steel facing of an article is not accomplished under the heat produced by brazing of the facing to the article, but after the process of brazing has been completed, and the steel is in a soft state, the article is filed and finished.

To harden the steel facing requires a re-heating of the article. Under ordinary circumstances this would be destructive of the brazing, as it would melt the brass, which would run out of the joint.

Evidently the one process is not the same with the other. N. claims that he has discovered a process by which this loss of the brazing is prevented, which is both novel and useful. He describes this process. It is that of so firmly holding the facing to the article, in connection of brazing and reheating, by a clamp, as to cause them to retain the brazing in position between them.

It is true that "the mere matter of clamping articles together for any purpose is not new;" but the matter of clamping them together for this purpose, although very simple, apparently, is new.

It was held by Mr. Chief Justice Marshall, in David *vs.* Palmer, 2 Brock 298:—"That it was not every change of form or proportion which was declared to be no discovery, but that which was simply a change of form or proportion, and nothing more. If by changing the form and proportion a new effect is produced, there is not simply a change of form and proportion, but a change of principle. The question will be, therefore, whether the change has produced a different effect.

Here the clamping is to a certain degree accompanied by certain effects which could not otherwise be produced, and without which there would be no improvement, as alleged. By the affidavits of experts, N. shows, moreover, that his process is in its results as described by him in his application.

In the opinion of this Board, the decision of the Examiners in this case should be reversed.

Washington, Dec. 20, 1865.

THE USE OF AMMONIA AS A MANURE.

It is a curious fact that plants cannot obtain the nitrogen that they need from the atmosphere, but that this element must be supplied by costly manuring. What makes this fact so curious is, that only 2½ per cent of the substance of plants is nitrogen, while this element forms the principal portion of the atmosphere—76·9 per cent. Furthermore, plants obtain their carbon, which forms about half of their substance, principally from the atmosphere, although the proportion of carbon in the atmosphere is not more than one-seventh of one per cent. The explanation of this is of course to be found in the relation of the chemical affinities.

Of all the eighty elements at present known, nitrogen has the feeblest affinities. It has no desire to enter into union or combination with other substances. It is the old bachelor—the recluse—the solitary among elements. It prefers to exist in its free uncombined state, rather than in combination or union with any others; and if, in exceptional circumstances, it is induced to combine with other elements, the slightest cause is sufficient to break up the union and restore nitrogen to its free and independent existence. In the atmosphere it exists in company with other substances, but though with them it is not of them—the association is a mechanical mingling—not the close union of chemical combination.

Before nitrogen can enter into the constitution of a plant it must be induced to combine with some other element which will carry it in. A plant may be perishing for want of a few grains of nitrogen, and though three-fourths of the wind that fans its leaves are constituted of this element, not a single particle can it drink in to save its existence. This was long in dispute, but now seems to be settled. Dr. F. Grace Calvert, in a recent lecture before the Society of Arts, England, after a very learned summary of the investigations on the subject, remarks—

An animated discussion, based upon a long series of researches, ensued between Boussingault and Ville, the latter contending that plants could absorb nitrogen from the atmosphere and fix it as a part of their organism; the former contending that the nitrogen contained in plants was derived either from ammonia or nitric acid. This discussion was still proceeding when Mr. Lawes and Drs. Gilbert and Pugh published, in the "Memoirs of the Chemical Society of London," 1863, such a complete and elaborate series of researches that chemists came to the conclusion that the nitrogen existing in plants was not derived from the atmosphere as nitrogen. There can be no doubt that the general tendency of scientific as well as practical investigation, as above stated, proves that it is most probably under the form of nitric acid, or more so in a state of nitrates, that nitrogen penetrates into plants, and becomes one of the essential elements of the formation of albumen, fibrin, legumin, or other nitrogenated substances which are found existing in vegetables.

An atom of ammonia is composed of three atoms of hydrogen and one of nitrogen, N H_3, and as an atom of nitrogen is fourteen times as heavy as an atom of hydrogen, the proportion by weight is three pounds of hydrogen to fourteen of nitrogen. Ammonia contains more nitrogen in proportion to its weight than any other compound. Nitric acid is composed of nitrogen and oxygen in the atomic proportion N O_5, and as the atomic weight of oxygen is 8, the proportion by weight is forty pounds of oxygen to fourteen of nitrogen. Dr. Calvert concludes that the nitrogen is first taken from ammonia to form nitric acid before it enters into the combination of plants. He says—

If the conversion of nitrogen into nitric acid, under the influence of certain mineral substances, has been known by its results for a long period in what is called the nitrification in the walls of our dwellings, still the demonstration of the conversion of ammonia into nitric acid is the result of comparatively recent researches.

The most interesting series of researches published on this subject are those due to M. Millon, which you will find in the "*Comptes Rendus de l'Academie de Sciences*, 1864," in which he has shown that the production of niter is in ratio with the quantity of vegetable matter, especially humic acid, that a soil contains, and that the most favorable land for the production of niter is that which is called mold by gardeners. He further ascertained that if he made a mixture composed of ordinary earth, 20 parts, ashes 4, mold 3, the production of niter was most active, and also that the oxygen of the air had a great influence on its production, converting the ammonia resulting from the decay of the organic matter into nitric acid.

These facts are well illustrated in the following table quoted from his researches:—

Nitrification.		Parts.
Soil	Earth	20
	Ashes	4
	Decayed manure	3
		Quantity of Niter.
Upper layer		440
Middle layer		441
Bottom layer		009

From the above you will gather that in the upper part of a bed (one meter in depth, and composed as above shown) there is far more niter than in the lower portions of it. These researches of M. Millon threw much light on those published some years since by M. Bonssingault, who ascertained the rate of proportions of niter that existed in various qualities of soils and also the influence of manured land on the production of niter in soils. Thus, M. Boussingault found that the quantity of niter in non-manured land was a mere trace; in uncultivated land there were from 1 to 0·5 in 1,000 parts of soil, while in cultivated land, and in highly-manured ground, 18 parts in 1,000. He further observed that if he manured a piece of land, after 7 days there were 12 parts of niter per 1,000; in 17 days, 81 parts; in 15 days more, 233; in 15 days more, 280; and in 15 days further, 260; and then the quantity decreased rapidly.

Continental Telegraphic Convention.

An imperial decree has just been published in Paris promulgating a convention, concluded in May last, between France on the one part, and Belgium, Austria, Baden, Denmark, Spain, Greece, the city of Hamburg, Italy, Holland, Portugal, Prussia, Russia, Saxony, Sweden and Norway, Switzerland, Turkey and Wurtemberg on the other, and which has for its object the organization of the entire telegraph system, and the establishment of a fixed international tariff. The dispatches are classed under three heads—those of the State, or Governmental dispatches, those connected with the public service, and, lastly, private telegrams. The tariffs will affix the amounts to be received by each country as regards transmission, receipt, and transit. The ratifications have been exchanged between all the powers, with the exception of Greece, Portugal, and Turkey, in which there has been some delay, and the convention was to come into operation on the first day of the present year. This arrangement will be of essential service to the commercial world by doing away with inconsistencies, and setting up a regular and fixed scale of charges.

PETROLEUM AS FUEL.

Report to the Trustees of the Petroleum Light Company, by Col. JULIUS W. ADAMS, Engineer, of experiments made at the Morgan Iron Works, New York, Oct. 11, 1865.

ENGINEER'S OFFICE, No. 128 BROADWAY, NEW YORK; October 15, 1865.

GENTLEMEN:—By your direction experiments have been in progress for some months having in view the elucidation of the principles and methods used by Mr. Simon Stevens for burning petroleum and other hydrocarbons in combination with jets of steam, which method, and the apparatus used, form the basis of the various patents held by your Company in this country and in England.

The difficulty hitherto has been in attempting to burn the crude petroleum, that the imperfect combustion alone attainable by the means in use, has resulted in great waste of the material, as shown by the dense smoke which invariably accompanied all attempts to burn it in a confined space. This and the difficulty of regulating the feed, have hitherto prevented a successful application of this material as a fuel in the generation of steam in boilers. I am well aware that it has occasionally been accomplished on a small scale, but no experiments, that I have knowledge of, have exhibited anything like the requisite command of the material in feeding the fire, or certainty in its use as a fuel. This remark is made in full knowledge of what has been accomplished in this direction by Messrs. Linton & Shaw, as well as by Mr. Richardson in England. This difficulty has, I think, been successfully overcome in the experiments conducted for your Company, and the crude petroleum, without other fuel than the chips for kindling the fires, has been burnt daily under a marine boiler, in a course of experiments extending from the month of May last, and proves more manageable, more under the control of the fireman, and develops an amount of heat greater than any fuel with which we are acquainted.

Mr. George W. Quintard, of the Morgan Iron Works, having offered us the use of a marine boiler for our experiments, we applied our apparatus to it, without regard to any disproportions which might exist between the two; further experiments being needed in order to determine their precise relative dimensions. The experiments thus far have not extended beyond the determination of the fact that petroleum may be used with great facility as a fuel under steam boilers, by a single fireman of ordinary intelligence. No minute analysis has been made of its comparative economy—the results thus far being regarded as merely general; but from the results herewith shown you will be enabled to determine how far our experiments sustain the claim we have advanced of having successfully applied this material to steam boilers.

The boiler used was an internal flue and return fire tube boiler, the shell measuring thirteen feet and nine inches in length, by six feet in diameter, with a grate surface of thirty-five square feet; contents about fifteen hundred gallons of water to the level of six inches above the upper line of tubes. There were three flues in the boiler, the center one, P, of 16 inches diameter, and the other two, R, 12 inches diameter. The boiler was not set as represented in Figs. 1, 2 and 3, which is the method recommended; but rested merely on three walls of the dimensions of the furnace walls. There were five rows of 2½-inch fire tubes, as shown in Fig. 2, being 75 tubes in all; the back connection being 15 inches by 3 feet 5 inches, and the smoke stack 30 inches in diameter. The boiler was unclothed. Fig. 1 represents the plan of the furnace, showing the arrangements of the retort or mixer, and the oil and steam tubes. Fig. 2 is a cross section of the boiler through the furnace, and Fig. 3 is a longitudinal section through the center of the boiler and furnace. The same letters refer to the same parts in the several figures.

REFERENCES.

A. Coil of Pipe from the Oil Reservoir.
B. Retort or Mixer.
C. Short Connecting Pipe.
D. Pipe leading to Oil Reservoir.
F. Burners, 90 in number, 1-16th inch each.
G. Steam Pipe.
K & H. Steam Valves.
M. Oil Valve.
N. Tubes into which are screwed the Burners.
P. Large Flue of Boiler.
R R. Smaller Flues of Boiler.

Fig. 1.

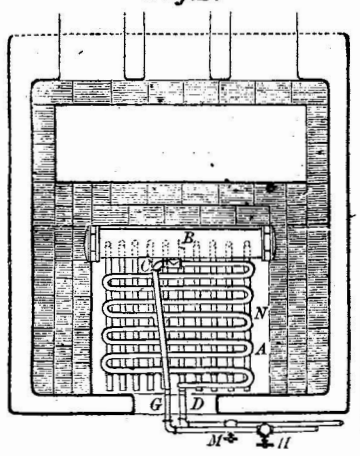


Fig. 2

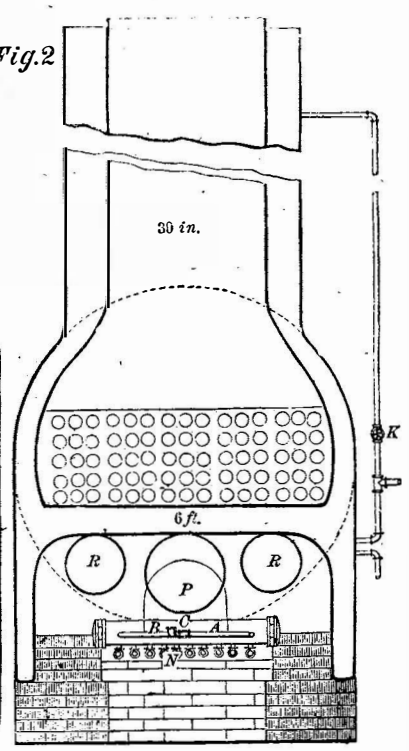
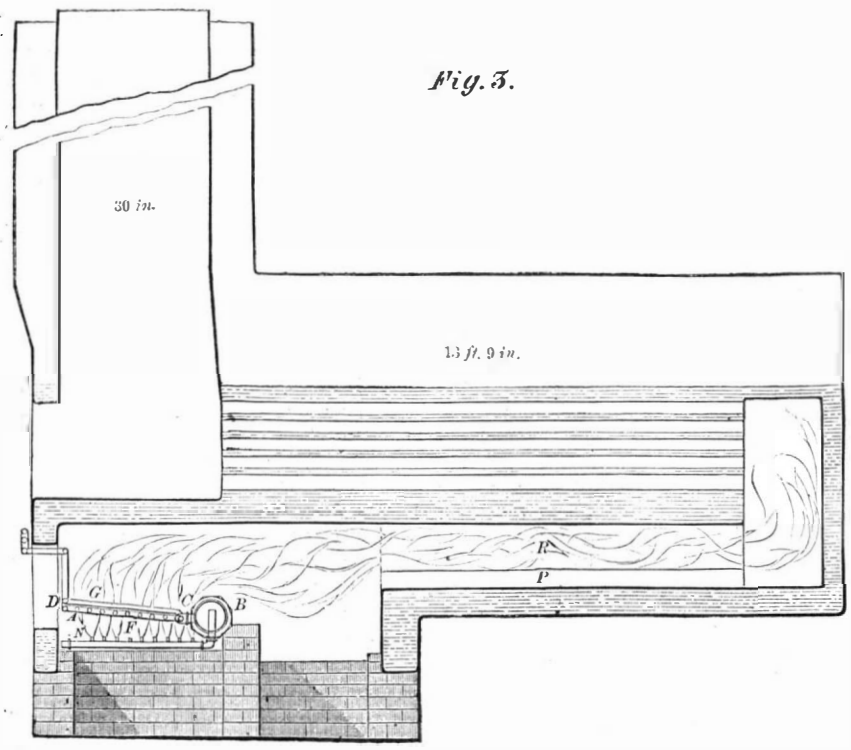


Fig. 3.



The fire bars were removed, and in their place a coil of three-quarter inch wrought-iron pipe, A, was inserted, the total length of pipe in the coil being 23 feet; at the back, directly across the furnace, a wrought-iron tube, B, or retort, five inches in diameter, and closed at both ends, was placed, with a short tube, C, of two inches diameter immediately in front of it. Into this latter tube (which communicates with the retort) one end of the coil is inserted, and the other end, D, passing out of the furnace door, communicates with the reservoir of oil, being in this case the cask in which it was brought to market. The flow of oil is regulated by a stop cock, M, placed near the furnace door. Some eight inches under the coil of pipe lie ten one-inch wrought-iron tubes, N, closed at one end, the other end inserted into the retort—these tubes lie parallel to each other, and are two feet three inches in length, and into each of them is tapped nine cast-iron burners, F, with one-sixteenth inch opening, making in all ninety burners. An inch above the plane of the coil, a wrought-iron pipe, G, proceeds direct from the short tube in front of the retort into which the coil is inserted, to the furnace door, and thence to the steam space of a small auxiliary boiler; a branch, with proper valves, K, connects this pipe with the steam space of the main boiler—the flow of steam being also regulated by a stop cock, H, placed in the vicinity of the furnace door, near the oil cock.

The water in the boiler being cold (sixty degrees), at fifteen minutes past two P.M. some billets of wood and shavings, weighing about 12 pounds, being placed upon the coil, near the furnace door, were lighted and the door partially closed; after an interval of 15 minutes the oil cock, M, was gradually opened, which permitted a flow of oil from the reservoir through the coil; simultaneous with which, or a little later, the steam cock, H, was opened, which conveyed steam of about 20 pounds pressure from the auxiliary boiler, through the heated steam pipe, G, above the coil, to the retort or mixer, B, where, combining with the vapor of oil from the coil, it passes into the straight pipes, N, under the coil, and is fired at the burners, F. The flame was vivid and intense, regulated in its force by the relative flow of oil and steam, and was entirely under the control of the fireman, who, at his pleasure, could reduce the flame to the flicker of an expiring lamp, or extend it by a single movement to a volume filling the large flues and furnace with its flame. No smoke or unpleasant smell was perceptible, and the combustion was complete and entirely manageable. Steam, at atmospheric pressure, was raised in the boiler in 29 minutes from the time of admission of oil into the coil. No measure was taken in this experiment of the amount of water evaporated, the apparatus not being considered as properly proportioned to exhibit the economical value of the fuel; and the experiment terminated in about one hour by closing the oil cock, M, and the fire was put out.

The analysis of this experiment may be shown as follows: As this experiment only exhibited the weight of oil which, consumed under the boiler, raised a given quantity of water from a given temperature of 60° to the boiling point, it is requisite for a comparison with the known effects of anthracite coal, to show the proportionate amount of oil which would be necessary to convert this same bulk of water into steam of the atmospheric pressure, or the weight of water which a pound of this fuel will convert into steam. According to Tredgold, the quantity of fuel which will convert a cubic foot of water, of a given temperature, into steam, at the pressure of the atmosphere, is obtained by multiplying the quantity of fuel which will heat a cubic foot of water one degree, by some of the latent heat of steam, and the difference between 212 degrees and the given temperature of the water. In this case, 212°—60°=152°. The latent heat of steam, according to Dr. Ure, is 967 deg., which, added to 152 deg.=1,119 deg, which, multiplied by the quantity of fuel which will heat a cubic foot of water one degree, will give the weight of fuel requisite to convert a cubic foot of water from the temperature of 60° into steam. This

product multiplied by the number of cubic feet of water to be converted into steam, will give the total amount of fuel required in this case.

Making the proper allowance for the pine wood in lighting the fires, the weight of oil consumed in the experiment was 60 lbs.; the contents of the boiler was 200 cubic feet, at a temperature of 60°, which was heated by this weight of oil to the boiling point =212°; thus the weight of oil which heated 200 cubic feet one degree was $\frac{60\text{lbs}}{152°}$=0·39 lbs; and the weight of oil which was requisite to heat *one* cubic foot of water *one* degree was $\frac{.39}{200}$=.0019 lbs. This multiplied by 1,119°=2·126, and this by the 200 cubic feet of water in the boiler, gives 425 lbs. as *the weight of the oil which would convert the contents of the boiler into steam at the atmospheric pressure* —or $\frac{200 \times 62·34}{425}$=29·34 lbs., as the *weight* of water at a temperature of 60°, which will be converted into steam by *one pound of oil*. From Isherwood's valuable experiments, on marine boilers—we find this same type of boiler in use on board the U. S. Steamers—and from the mean of the experiments conducted on these boilers, we find the quantity of water evaporated, from a temperature of 100° with steam at the pressure of the atmosphere, by one pound of anthracite coal, to be 8·5 pounds. To compare this with the evaporation made from a lower temperature of water by means of the oil, this weight must be reduced in the following ratio, established by Isherwood: $\frac{966°+1152°}{966°+1152°}=\frac{1078}{1118}$=0·964, which multiplied by 8·5, gives 8·16 as the weight of water at 60°, converted into steam of atmospheric pressure by one pound of anthracite coal.

Comparing this result with that above shown for the product of the combustion of oil, we find the evaporating power of the two fuels to be in favor of the oil, in the ratio of 29·33 to 8·16, or 3·6, weight for weight; the coal and the oil occupying about the same space for a given weight. That is to say, a cubic foot of coal as stored aboard ship, will weigh about the same, or a little less, than a cubic foot of oil, the first weighing from 43 to 52 pounds, and the latter about 54 lbs. to the cubic foot.

Further experiment, with improved apparatus, will be necessary in order to determine the precise economic value of this fuel in comparison with coal, but the advantages of the oil as a fuel for marine engines may be briefly summed up as follows:—

Rapidity with which steam may be raised—reduced dimensions of boiler and furnace below that required for coal—the continuous firing effected by feeding the fuel through a pipe into the furnace, thereby preventing the great loss of heat in the furnace every time a fresh supply of coal is thrown on, and the rush of cold air upon the opening of the furnace doors —the freedom from smoke, cinder, ash, or refuse of any kind, which in coal reaches from seven to over sixteen per cent of the whole amount. In the ability to command a forced fire almost instantly, without a forced draught, which, under some circumstances at sea, is of vital importance. In dispensing with the numerous class of coal heavers, stokers, etc., and all the inconvenience of raising clinkers and ash from the furnace rooms; and finally the diminished space occupied in the storage of the fuel.

Respectfully submitted,

JULIUS W. ADAMS, Engineer.

The above experiments were made in presence of Capt. Bythesea, R. N., Sec'y. of Her Brit. Maj. Legation at Washington; Cyrus W. Field, Esq., Hon. James Wadsworth, Hon. Horace Greeley, Hon. David Dudley Field, John E. Williams, Esq., President Metropolitan Bank; William A. Thompson, Esq., Vice-President Erie and Niagara Railway; Geo. W. Quintard, Esq., Morgan Iron Works; Mr. James Farron, Superintendent Morgan Iron Works, and officers of the Company.

AS ONE of the workmen employed at Whitewell's Blast Furnace, South Stockton, was recently taking a slag ball from the furnace, a tipper named Henry Badley, was about to tip it when it burst, and the molten slag flew over him, setting his clothes on fire, burning him severely on various parts of the body, and melting his watch.

THERE will be but one eclipse this year that will be visible to us—a total eclipse of the moon, March, 30th.

THE FOOT LATHE.

Number 8.

[Continued from page 66.]

An indispensable article on a foot lathe, where any fancy work is to be done, is the centers—of which we have before spoken—shown in Fig. 40. These consist of a common set of heads, with spindles fitted to them. One spindle has an index plate and spring, and the other has a common center. These heads set on a slide that is moved back and forth over a rest, screwed to the lathe bed as usual. It is easy to see that with this we can do some very fine cabinet work. Suppose we have a round vase turned up handsomely, and we wish to flute the base or make it a series of curves all round; to do this we have only to put it in the centers, set the index so as to come out even, as before explained, and go ahead.

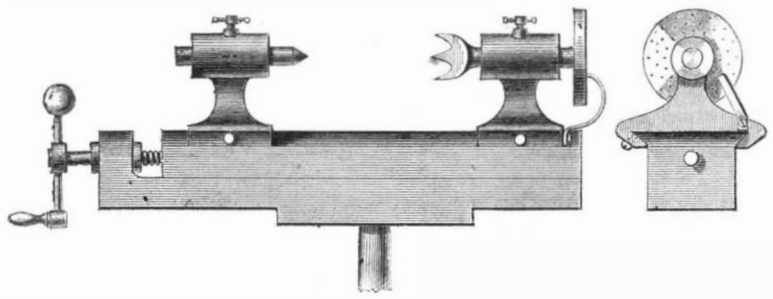


Fig. 40.

The kind of cutter to be used is a sort of gouge set in a cast-iron head, something as a plane iron is set in its stock. That is, fitted tight to a groove and held by a set screw. Two of these cutters should be used at equal distances apart, and the cutter head should be keyed on a short shaft set between the main centers of the lathe. The whole should be accurately balanced, or else the work will be full of chatters or ridges. Since centrifugal force increases as the square of the velocity, any thing that runs a little out of truth will be very much exaggerated as the speed increases. By using cutters of different shapes, beautiful effects can be produced; as, for instance, suppose we take a common round-nose cutter, set the index so as to divide the circle of the job we are to work on in twenty-four parts, and execute that part of the design, then take a tool forming an ogee and work out the spaces intervening, we shall find that the article, when completed, will have a beautiful appearance, and that instead of being round the bottom will be octagonal, which will present a pleasing contrast to the rest.

The centers can be set at any angle with the cutter shaft, and a pineapple pattern can be made on straight surfaces by executing one part at one angle, then reversing the rest that carries the centers, and finish the remainder, one part of the pattern crossing the other.

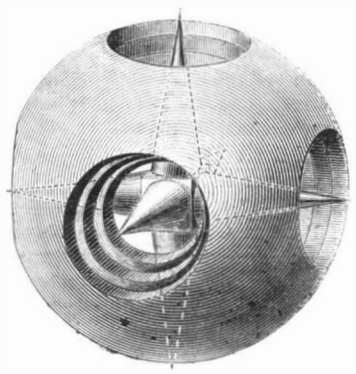
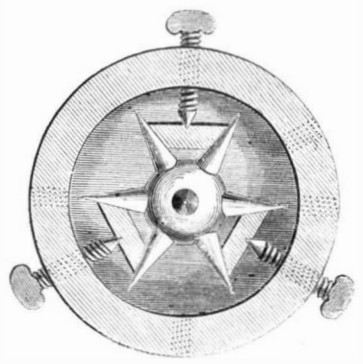


Fig. 41.

We present herewith views of a novel ornament which exhibits great mechanical ingenuity and manual dexterity, but is otherwise of no value. It consists, in one form, of a globe with a series of rings or globes inside, and a six-armed spur projecting through holes—all cut out of one solid piece.

This figure shows how the points are turned. After the internal rings are cut out with a quadrant tool like Fig. 43, and the spur also severed, by cutting in the ends of the holes (not boring them out solid), the globe is put in a shell chuck with three set

Fig. 42.



screws in it, as shown. The set screws go through the holes in the globe, and the cross pieces in between the spurs serve to steady the job. Any number of points may be turned in the globe. Fig. 44 shows a polygon with many spurs turned inside. At first sight it would appear that the tool severing the rings would cut off the points also, but it will be seen that this is not the case, for the holes being bored so as to leave a core standing (which afterward serves to

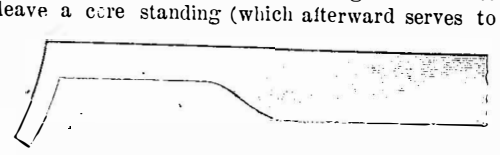


Fig. 43.

make the points of the spur), the severing tool falls into the holes and goes no further, and each division serves as a guide for the tool in the next hole, so that the globe is made the same size, without jags. The quadrant tool, shown before, must be followed round

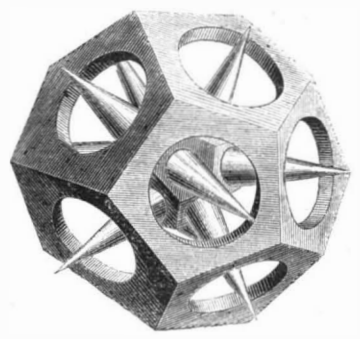


Fig. 44.

the shell in the act of cutting it out, so that it will make the same round, and the globe must be shifted in the chuck to reach all the holes. It is no easy task to make this little affair, for all it looks so simple.

ARRANGEMENTS have been made with Mr. G. W. Beardslee for the purchase by the Government of the torpedo implements used by him in destroying vessels of war, harbor obstructions, forts, and batteries, etc., by means of submarine explosions. Mr. Beardslee has recently been occupied at Chatham in making the preliminary arrangements for some futher additional experiments on a much more extended scale than any previously undertaken, with the object of further demonstrating the importance of the new agency for the destruction of forts and vessels of war.

MR. G. W. CUSHING, master mechanic of the Chicago and North-western Railway, has sent us a spirited colored photograph of locomotive designed by him for the company, for which we return thanks.

THE application from the artisans employed in the different dockyards for an increase of wages, has been refused by the English Admiralty.

Correspondence

Casting Car Wheels---Invention Wanted.

MESSRS. EDITORS:—Your correspondent, H., of Reading, Pa., relates that several accidents have happened in his neighborhood by breaking of car wheels; and he attributes the failure of the wheels to the fact that they are usually cast in cupola furnaces, and of iron having a low tensile strength. He refers to the experience of ordnance officers, on improving irons, by remelting in reverberatory furnaces.

In the cupola furnace, sulphur from the coal, and other deteriorating elements unite with the iron more rapidly than in the air furnace; but the improvement in the quality of the iron in the air furnace is due principally to the better mixing of the irons, of the charges, and to the refining that occurs while in fusion. This is shown plainly by an experiment that is often conducted at an ordnance foundery, by drawing from the furnace a small quantity of iron immediately upon all the iron being melted, and casting into a convenient form for testing its tensile strength; and by casting other pieces of the same form and size from the same iron after it has been in fusion one hour, two hours, and three hours, or at other periods; each test piece will usually be found to have increased tensile strength proportioned to the time of fusion, within certain limits. If the test pieces are taken from blocks of different sizes, cooled differently or unequally, the comparison will be lost; for the test piece is no indication of the strength of a large mass, if it is taken from a small casting, or one subjected to a different rate of cooling. Even a test piece cut directly from the large mass is not a true indication of the strength of the iron in the whole casting, because, in cutting out the test pieces, "initial tensions" may be relieved from the test piece, while they remain in the large mass in full force. So, if a small test piece had been taken from one of the 15-inch Rodman guns, that split spontaneously at the foundery at Pittsburgh, transverse across the line of later rupture, the test piece would have shown the tensile strength to have been nearly what was the estimated strength of the iron of which the gun was made, yet the gun burst afterward with no other force acting upon it than "initial tensions" induced by unequal cooling. Car wheels should be put upon their axles without "initial tensions." This can be nearly accomplished by annealing, as practiced by one or more of the manufacturers, or by giving them a proper amount of elasticity by their form, and next by adjusting them on the axle with a key, instead of forcing them upon the wrought-iron axle, upon a slightly tapered bearing, by which severe tension is produced. Car wheels break more frequently in winter than in summer; the eye of, and, in fact, the whole wheel is much contracted by the low temperature of the season; the friction of the journal warms and expands the axle within the wheel already strained by forcing the axle into it, and hence the frequency of the accidents. Notwithstanding the number of inventions and patents upon car wheels, here is a necessity which should be the mother of an important invention; who among your readers will be the father of it?

NORMAN WIARD.

New York, Jan. 17, 1866.

Ozone and Cholera.

MESSRS. EDITORS:—Dr. Scheil says: "Ozone is oxygen in a highly electro-negative condition, and air or oxygen ozonized by means of electricity, phosphorus, light, or any other method, may be combined with non-ozonized air or oxygen to form a galvanic circuit."

In support of the above theory, I will present a few facts that have come under my own observation.

In dry, sultry weather, when there is the least amount of ozone present in the atmosphere, telegraph lines are frequently interrupted by the current coming in contact with non-ozonized oxygen, which forms independent or contra-galvanic circuits on the wire, rendering the transmission of messages very difficult or impossible for the time being. A thunder storm at such times always has the effect of destroying such contra circuits. Telegraph lines always work more or less imperfectly in hot weather, and particularly so where the lines are built parallel with large rivers on the low ground, where the least amount of ozone is present.

Ozone is destructive to malaria, and highly beneficial to health in times of cholera or other malarial epidemics.

In telegraph offices there is always the maximum amount of ozone, or highly electro-negative oxygen combining with the non-ozonized oxygen, and thereby rendering the atmosphere pure. During the prevalence of cholera in this country from 1849 to 1854, inclusive, I was connected with the telegraph lines in the States west of the Ohio river, and during that whole time I never knew an instance of a telegraph operator dying of, or even being attacked with, cholera, and in those days telegraph offices in the river towns were generally located in low grounds where cholera prevailed to the most alarming extent.

A. T. HAY.

Burlington, Iowa.

Blowing Out Boilers.

MESSRS. EDITORS:—Having been a constant reader of your valuable paper for the past ten years, and although I take some three or four other papers, yours is always the first to be read.

I have been much interested in the series of reports on boiler incrustations in the late numbers of your paper. I have been running a steam saw mill for the past thirteen years, and have had some experience with steam boilers, and from my experience and observations on the subject, I have come to the conclusion that, if a boiler is cleaned in the right way, incrustations can be prevented even if the water is strongly impregnated with lime or other impurities. A boiler should never be "blowed out." For two years I cleaned by blowing out, and, after cooling to brush out the dust with a broom, wash out with water, etc., in the usual manner, I found that the boiler retained sufficient heat to cause the lime and sediment to unite with the iron, and after it once commenced forming scale, the deposit of lime was greatly increased. I found that the above method of cleaning would never do, as it was ruining my boiler. I then adopted the following method of cleaning: I run the water down, say on Saturday evening, nearly to the top of flues, let it stand until Monday, opening the man-hole. The water is quite warm; I then use a long rake or scraper running it on the top of flues on the sides at the water lime, stirring effectually. I then have a man to knock in the hand-hole, keeping my rake on the bottom, and stirring it rapidly while the water is running out—carrying with it all the sediment and dirt in the boiler. I then let in cold water sufficient to cool it; then have a man enter with broom and scraper, and in twenty minutes the boiler is clean, ready for filling. I have adopted the above course of cleaning for eleven years past. My boiler is bright and clean, and nearly as good as new, and shows no sign of forming scale, although the water in use was strongly enough impregnated with lime to form a stone half an inch thick in my feed pipe three different times in eleven years. I will guarantee that whoever tries the above plan will never "blow off a boiler" again.

DAVID MCCURDY.

Ottawa, Putnam County, Ohio, Jan. 12, 1866.

Screw Cutting.

MESSRS. EDITORS:—Having been a reader of your valuable paper, more or less, for twenty years, I have, during that time, seen a great many communications on various subjects, and among them I have seen quite a number of rules for finding the gear for cutting screws, but I have not yet seen a rule that I consider either simple or direct, as none of your correspondents tell us how or where to find the multiplier, and as none of them have done so I will now give my rule for finding the multiplier, as it will do for all screw-cutting lathes. I find the multiplier from the gear that belongs to the lathe on which I want to cut a screw, and I find it by looking at the gear and find the ratio of increase in the teeth, and use that for the multiplier. I will now give an example. In my shop I have two lathes for screw cutting. On one the ratio of increase in the teeth is 5, commencing with 20, 25, 30, etc., so 5 is the multiplier to use for that lathe. As for example, if I want to cut a screw at 12 threads per inch, the lead screw being 4 threads per inch, I multiply 12 by 5 which gives 60 and 4 by 5, which gives 20, so 60 and 20 would be the gears required. And if I want to cut a screw coarser than the lead screw, then I double the ratio of increase for a multiplier. On my other lathe the ratio is 6, commencing with 24, 30, 36, etc. So 6 is the multiplier. If I want to cut 12 threads, the lead screw being 4 you then have 12 by 6, 72, and 4 by 6, 24, so 72 and 24 would be the gears required.

D. BOOTH.

Dunleith, Ill., Jan. 11th, 1866.

Mr. Winans on Incrustations.

MESSRS. EDITORS:—I notice with pleasure the publication of the very able report of Prof. Chandler on incrustations; it proves him thorough master of his profession, and I trust will convince steam-boiler owners—coming as it does from a disinterested source—of the utility of using something to obviate the evil. I have advanced these same ideas repeatedly, during the past ten years, urging at the same time the adoption of the anti-incrustation powder prepared by me for preventing scale, and I must add with great success, having over six hundred converts to my arguments for the use of it. Imitations and purported improvements rather prove its success, and I beg you will recommend the same when opportunity offers. The very trifling cost—six to ten cents daily—should induce its more general use, and no doubt will when people open their eyes to facts as stated by Prof. Chandler.

H. N. WINANS.

[We publish the above as received. Mr. Winans' anti-incrustation mixture is extensively employed by prominent engineers, and this is a strong recommendation. But its cost, which Mr. Winans says is trifling, depends, we suppose, upon how much is used. A very small quantity, according to his theory, will do the business.—EDS.

A Petroleum Engine.

MESSRS. EDITORS:—Common illuminating gas forms an explosive mixture with atmospheric air, so does the vapor of benzine and other light hydro-carbons. The two former mixed in proper proportions, and fired by the electric spark, is the motor used in the newly-introduced gas engines.

Now, why could not the latter be employed in an engine worked on the same principle? No condensation of the benzine vapor will occur as when conducted through long tubes, and but comparatively little heat is required to vaporize it.

This suggestion is only made; let the details (if there are no greater impediments to overcome than mechanical) be carried out by our inventors.

E. L.

Hackettstown, N. J. Jan. 16, 1866.

Creosote for Preserving Timber.

MESSRS. EDITORS:—I notice a communication in the SCIENTIFIC AMERICAN of January 13th, from Edwin Battley, in reference to preserving timber by creosote. He speaks of its being the best mode for preserving timber, and says the creosote must be forced into the pores of well-seasoned wood, and for railway sleepers on a large scale expensive appliances are needed.

I agree with him most perfectly that creosote is the best preservative of wood, as it is also of flesh; for raw flesh that has been saturated with creosote is incapable of putrefaction. I also agree with him that the wood must be well seasoned. But I differ with him widely in the idea that it needs an expensive apparatus to force the creosote into the wood, either when used on a large scale for railway sleepers, or on a small scale for any other kind of lumber or timber. By using superheated steam, as I explained in a former number of the SCIENTIFIC AMERICAN, for seasoning the timber, the creosote can be vaporized at that stage of the seasoning when most of the moisture has passed out of the timber but while the pores of the timber are still open, so that the creosote will pervade all parts of the timber quite as effectually as smoke pervades a ham or other flesh. Besides, the seasoning, drying, and creosoting can all be done at one operation. Any number of cars may be loaded with timber or ties, and passed into the dryer, and when the timber is seasoned, dried, and

creosoted, on the car, the car can pass out to be either unloaded or to allow a fresh car-load of timber to take its place. The creosoting in this way is done at a merely nominal expense, and with a very cheap apparatus. No pressure is needed, and not even a steam boiler is required.

I once offered a Western railroad company, who obtained all of the ties for their road at one end of it, to season, dry and creosote every tie to be used on their road, provided they would simply pay me their regular charge per hundred, on the amount of weight I saved in their transportation from the place of their reception to the place to be used in the road; thus virtually charging the company nothing for the advantages to be derived from having the ties seasoned, dried and creosoted; although at a moderate estimate, it would save them not less than half a dollar on each tie, by its increased preservation, including the labor of one change of ties. But the company, on learning the simplicity of the process, found they could prepare the ties themselves, at even a cheaper rate than that.

It is a matter of great surprise to me, that such shrewd, money-loving, and money-making men as are some of those who have charge of railroads, do not more consistently practice "Poor Richard's" maxim, that a "penny saved is two pence earned," and preserve their car sills, railroad ties, bridge timbers, etc. The time is near at hand when this must be done as a necessity, for the timber is fast fading away along the lines of our great thoroughfares. This process of preservation is a very simple one, and can be done as above at an average cost of $1 per M., while the saving in freight alone will often pay several times the entire cost of seasoning, drying, and creosoting. If the great bugbears of expensive apparatus, laborious and costly handling, with a supposed mysterious manipulation, can be removed from the minds of practical men, we may soon see the work commenced and go forward in earnest.

H. G. Bulkley.

Cleveland, Ohio, January, 18, 1866.

The Way Varnishes are Made.

Messrs. Editors:—In the Scientific American, No. 1, current volume, I saw an article, "Solvent for Shellac," and a saturated solution of borax, mentioned as such. This solution is used by hatters. I hereby give you the method of bleaching shellac (where you will find another solvent), and different kinds of varnishes, etc.:—

For one pound of good shellac take four ounces of crystallized carbonate of soda, and one gallon and a half of water; put the whole in a clean iron or copper vessel of double the capacity, and, under constant stirring, bring it to boiling over a slow fire. The shellac will dissolve, and, if it is intended to make colorless French polish, the solution has to be run through a woolen cloth. For brown bookbinder's varnish, or a colorless varnish for maps, photographs, etc., the solution has to boil for about an hour longer, but only simmering, and then to cool very slowly without stirring; better let it stand over night, and let the fire go out under it. In the morning you will find a wax-like substance on the surface of the solution, and the other impurities of the shellac as a deposit on the bottom of the vessel. The solution is likewise to be run through a woolen cloth, and then to be filtered. For the filter, I take a small wooden keg, remove the top and bottom, and fasten to one side a piece of muslin; on the muslin I bring about four inches of fine, washed sand, and on top of the sand a layer of clean straw; then I pour the solution into the filter and let it run through. Should the first portion run through not be perfectly clear, like red French wine, it has to be brought back to the filter. When nothing will run through any more, pour some clean water on the filter to wash the remaining solution out. If you intend to make a transparent brown varnish—bookbinder's varnish—this filtered solution has to be precipitated with diluted sulphuric acid (one part acid to twenty parts of water), the precipitate collected on a coarse muslin cloth, and washed out with cold clear water till it runs through without taste. Then fill a stone or wooden vessel with boiling water, and throw the precipitate in it; it will directly soften and stick together; this half mass has to be kneaded in the hands, doubled up, melted, and drawn ont till it assumes a fine silky luster, then drawn out to the desired thickness in sticks, like candy, and it is then ready for solution.

To make white French polish, or transparent colorless varnish for maps, the solution has to be bleached. The bleaching fluid is made as follows, and the proportions are for one pound of shellac: Take one pound of good English chloride of lime, dissolve it in fourteen pounds of cold water, triturating the lumps well, let it subside and decant the clear fluid; add seven pounds of water to the residue, and when subsided, add the clear liquor to the other; precipitate this liquor with a solution of carbonate of soda, let the carbonate of lime settle, and decant the clear chloride of soda; wash the sediment out with water and add the clear liquid to the former, put it in a high stone jar, and give it a rotary motion with a wooden stick, pouring in at the same time very diluted sulphuric acid, till it assumes a greenish color and a smell of chlorine is perceptible. Then add of this liquid to the solution to be bleached, under constant stirring, till all the color is gone. French polish will look like milk, colorless varnish like whey, but more transparent. Then precipitate with dilute sulphuric acid, exactly as the solution for bookbinders' varnish, and treat the precipitate in the same manner, in hot water. All iron must be carefully avoided as soon as the chlorine liquor is added.

To make the different varnishes, it is only necessary to dissolve the different precipitates in alcohol. For bookbinder's varnish take one part to two and a half parts alcohol; French polish, one to three; colorless varnish, one to two and a half, and add to the varnishes (not to the polish) one and a half drams of oil of lavender for one pint. For photographs this solution is too strong; one part of bleached shellac to six parts of alcohol will answer. For maps the solution should not be applied immediately to the paper, but the latter should first receive a coat of boiled and strained starch.

By dissolving shellac, either in a solution of borax or in one of an alkali, shellac acts as an acid—like most other resins, or like stearic or margaritic acid, contained in the fats—combining with alkali and forming a kind of soap, easily decomposed by any of the common acids. The waxy matter, not saponifiable, is by slow boiling separated, and lighter than the solution, swims on the surface, where, after cooling, it can be collected. It is harder than common wax; made into candles it burns like wax, and resembles the vegetable wax of commerce.

It is a remarkable fact that all shellac contains a small quantity of arsenic, in the form of yellow sulphuret; it is found in the residuum, after the solution has cooled and is decanted off in small golden yellow particles, and out of a solution of ten or more pounds enough can be picked out to reduce it to metallic arsenic.

Gustavus A. Schmidt.

Swatara, Pa., Jan. 13, 1866.

Table for the Teeth of Gears.

Messrs. Editors:—Annexed is a table as a sample of the evidence on which my argument was based on the teeth of wheels. I have examined quite a number of books in two large libraries—the Franklin Institute and the Mercantile Library—and cannot find one in which a correct rule or table on the subject is given. None of them attempts to go lower than 10 teeth; in one there is a note of caution regarding the pitching of pinions below 20 teeth, but no rule or table appended.

I am obliged to your correspondents for my attention being directed to the subject, though none of them has given any data, by which such tables as these can be made:—

Number of Teeth.	Diameter.	Pitch.	Number of Teeth.	Diameter.	Pitch.
2.....	·7071	1·4142	10.....	3·196	·31287
3.....	1·	1·	11.....	3·5135	·28462
4.....	1·3065	·76536	12.....	3·831	·26105
5.....	1·6183	·618	13.....	4·148	·24107
6.....	1·93185	·5176	14.....	4·466	·22392
7.....	2·247	·445	15.....	4·7835	·20905
8.....	2·563	·39018	16.....	5·1011	·19603
9.....	2·8795	·3473			

How to Use the Table.—When the number of teeth and the pitch is given, take the diameter corresponding to the number of teeth and multiply by the given pitch for the diameter; when the number of teeth and the diameter is given, take the pitch opposite the number of teeth and multiply by the diameter for the pitch.

Daniel MacAlpin.

Philadelphia, Jan. 17, 1866.

American Sanitary Museum.

Messrs. Editors:—Penetrated with the idea that the Sanitary Commission of the United States, by mitigating the horrors of war, had resolved one of the most urgent questions of modern time, I was one of the first persons in Europe who endeavored to acquaint the public with the organization and the results of that admirable institution. I first published a book, "*La Commision Sanitaire, son origine, son organization et ses resultats,*" in which I conscientiously expressed the efforts and the final success of the Sanitary Commission during the gigantic struggle that the United States sustained with unabated courage. Afterward appeared my French translation of military, medical, and surgical essays. By acting so I felt I was serving both the cause of humanity and that of my native country.

After having shown the wonderful results of the Sanitary Commission, it would be just and proper now to acquaint the public with the great number of ingenious inventions made by my countrymen in view of relieving the sick and the wounded soldiers.

In order to realize that project, I intend to assemble in a collection the products of those inventions which have enabled the Sanitary Commission to fulfill its mission.

The universal Exhibition that is to be opened in Paris, in 1867, is certainly the best opportunity for the inauguration of this Sanitary Museum. During that exhibition no civilized nation will be unrepresented in the French metropolis. The articles exhibited in such a museum will therefore call the attention of all those who wish the welfare of mankind, and acquaint all nations with the name of their inventors.

In addressing myself to my countrymen I am firmly convinced that they will assist me in my patriotic and humanitary enterprise. Although I am willing to purchase all such as may be useful, I shall gratefully accept any object that the inventors or manufacturers would wish to contribute.

I therefore most respectfully request all such persons who are disposed to co-operate in the creation of the American Sanitary Museum, to address their communications to Dr. Thomas W. Evans, 15, rue de la Paris, France, or to M. Abner L. Ely, No. 22 Pine street, New York.

Thomas W. Evans, M.D.

Paris, Dec. 1, 1865.

[Mr. Ely is one of our most substantial and reliable citizens.—Eds.

The Finish of Unvarnished Walnut.

Messrs. Editors:—Will you please inform me, through your column of "Notes and Queries," or otherwise, how to produce the dead, smooth, dark surface on walnut-wood carvings, furniture, picture-frames, etc.? The finish I refer to brings out the color of the wood like oil, but without its stickiness, and swelling of the grain which cannot be smoothed down again, and does not give the sickly yellow color which varnish imparts to the wood.

Edward Everett.

Quincy, Ill., Jan. 13, 1866.

[Can any of our correspondents answer this query?—Eds.

A Fossil Spider.—An English paper recently contained a description of a fossil spider discovered by Professor F. Romer. The fossil was found in a piece of scale from the coal measures of Upper Silesia. The specimen is perfectly preserved, and shows the four pairs of feet with all their segments, the two palpi, and even the coriaceous integument of the body and the hairs attached to the feet. Spiders have not hitherto been found in any rocks older than the Jurassic, but by this discovery their presence in Paleozoic rocks is proved.

Acclimatization of Ostriches.—The *Farmer* (Scotland) states that "there had been received at the Garden of Acclimatization of Paris, a hen ostrich bred at Grenoble, and four chickens hatched at Algiers. The ostriches in domestic life are quite farmyard birds; they lay, sit, and raise up their young like ordinary fowls."

Improved Grinder and Driller.

This instrument is intended for dentists' use, and is designed to enlarge cavities and remove the carious portions of the bone with dispatch. From the nature of the mechanism employed to drive the cutting tool, it will be seen that the object is attained.

In the engraving, A represents a train of gearing of the usual kind, driven by a spring in the barrel, B. This spring is wound up by the key, C, at the end (see sections), and will run for a long time; the cutting tool, D, at the end is stopped or started by a spring stop, E, which catches in the vanes of the fly, F. The tool can also be diverted from a straight line and used at an angle of 45 degrees, as shown. A universal joint, G, is provided, so that the rotary action is transmitted without any irregularity.

Externally the instrument is as shown in Fig. 1; this view is very nearly the full size. It can be easily grasped in the hand and directed to any part of the mouth with great facility. There is no prying or pushing in its use, so apt to be the case with the old-fashioned tool, and the patient suffers much less accordingly.

A patent is pending through the Scientific American Patent Agency. For further information address, Philo Soper, inventor, London, C. W.

Fig. 1

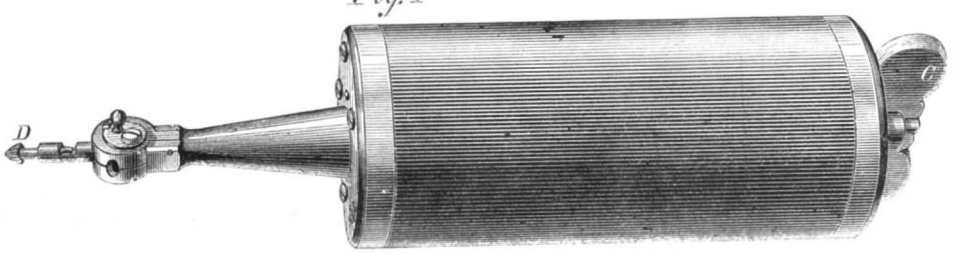
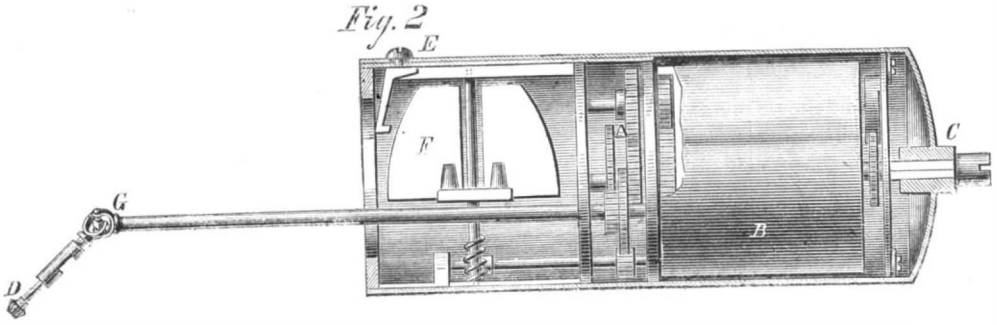


Fig. 2



SOPER'S GRINDER AND DRILLER.

THE WAY THE MONEY MARKET IS SUPPLIED.

In reading the money articles in our leading daily papers it is manifest that nearly all the writers suppose the supply of loaning capital—the supply of the money market, as it is called—depends mainly upon the quantity of currency or money in the community; the truth is, this supply is influenced very little, if any, by the quantity of money in the country. This will be made plain by the examination of an individual case.

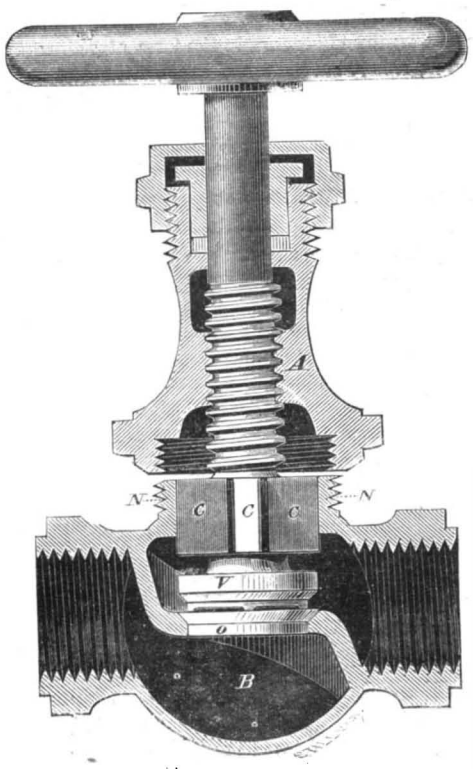
John Robbins, one of the money lenders of this city, recently died. It is said that fifty years ago he had accumulated $100,000 in the jobbing trade, and that at the time of his death his funds at interest amounted to $4,000,000. In fifty years the amount of capital that he supplied to the money market of Wall street had increased $3,900,000; let us see in what form this increase was made, and what connection it had with the volume of currency in circulation.

Mr. Robbins kept the run of dealers in dry goods, and confined his purposes exclusively to their paper. It is well understood among traders that the amount of their sales depends mainly upon the stock of goods which they have to sell; and, as their profits are proportioned to their sales, they all strive to keep as large a stock of goods as possible. When, therefore, their own capital is all invested in goods, they are generally ready to hire the capital of other men, if it is offered on satisfactory terms. It is plain that if they hire capital and keep it on hand in the form of money, they will lose the interest on it; in fact they do not want it for this purpose; they want it to increase their stocks of goods, and so soon as they hire it, they invest it in merchandise. The capital that our dry-goods dealers hired of Mr. Robbins enabled them to increase their stocks of dry goods. The enlarged stocks augmented their sales and profits, thus giving them the means to pay Mr. Robbins his interest. As the interest accumulated Mr. Robbins loaned that also, and it was immediately invested in stocks of dry goods. Thus his accumulation of $3,900,000 took place in the form of bales and cases of cloths. Had he taken a fancy to loan his funds to leather dealers his accumulation would have added $3,900,000 to the stocks of leather and hides. He called his investments "money at interest," but it would have been nearer the truth to call them merchandise at interest. It is true that Mr. Robbins paid money for each of the notes when he bought it, and each was paid in money when it was due. So is money paid for a bushel of wheat or a barrel of pork when it is bought and sold, and there would be just as much propriety in calling a pork barrel money, as in calling the capital loaned by Mr. Robbins money.

The whole supply of capital to the money market of Wall street is made by individuals like Mr. Robbins. This supply is increased by these men spending less than their income; it is diminished when they spend more than their income, or when they make loans that are not repaid. It is neither increased nor diminished by the quantity of currency circulating in the community.

POWELL'S GLOBE VALVE.

It is well known that globe valves frequently require grinding so as to keep them tight, and prevent leakage through them into the cylinders. Instances



have been known where engines have started from steam creeping through the stop valves and caused great damage.

In this engraving we show a new method of construction whereby the valve may be ground in at any time by merely removing the cap. This method also permits the valve to be constructed much more cheaply than usual, for a large number of parts may be made up at once and put together irrespective of one being specially adjusted to the other at the time of making.

In the engraving, A represents a screw cap fitting over the shell, B, as usual, at N. The top of the chamber is bored out parallel with the seat so as to receive the wings, C, of the valve, V. These wings, in addition to others at the bottom of the valve, serve as guides to the same, so that as it is drawn up or down by the screw on the stem, it always rises true, furthermore, by simply raising the cap, as shown in the engraving, and rotating the wheel, the valve will bear truly on the seat and be ground in a perfect manner, at the same time the steam passages are unobstructed, and the area of them remains the same.

The invention was patented on May 2, 1865. For further information address the inventor, James Powell, Union Brass and Plating Works, Box 247, Fifth street, Cincinnati, Ohio.

A NOVEL STORE.

We have received from Messrs. Kennedy & McCandless, of Oil City, Pa., a photograph which represents an immense barge safely moored at the Phillips Ferry Dock. The trade circular of this enterprising firm, informs us that the barge bears the name of Floating Palace "Scientific American."

The photograph represents the palace as bearing on its side, in bold letters, the title

SCIENTIFIC AMERICAN,

to which is added the following miscellaneous list of articles kept on sale in this modern Scientific Palace, viz., cigars and tobacco, pipes, pens, ink, paper, pencils, fish hooks and lines, dominoes, ready-made clothing, boots, shoes, carpet bags, *umberellas* brooms, lamps, lanterns, oil and wick thread, needles, pins, brushes, window glass, demijohns, planks, buckets, smoking mixture, clocks, watches.

This firm is bound to succeed.

Statistics of Manufactures.

The Secretary of the interior, in response to a resolution of the House, communicates a list of the cities of the United States with the statistics of their manufactures, including those having 10,000 inhabitants and upward. It includes 102 cities, beginning with New York and ending with Newport, Ky. The total capital employed is $417,129,234; hands employed, males, 410,920; females, 147,000; value of products, $874,934,827. New York stands first in the list. Capital, $61,212,757; males employed, 65,483; females, 24,721; value of products, $159,107,369. Philadelphia employs a capital of $78,318,885; male operatives, 68,350; females, 30,633; value of products, $135,979,777. Cincinnati is third in order; products, $46,000,000; capital, $17,000,000 in round numbers. Boston; products, $36,000,000; capital, $13,000,000. The other principle cities produce as follows:—Brooklyn, $34,000,000; Newark, $22,000,000; St. Louis, $21,000,000; Baltimore, $21,000,000; San Francisco, $19,000,000; Lowell, $18,000,000; Providence $15,000,000; Louisville, $12,000,000; Richmond, $12,000,000; Pittsburgh, $11,000,000; New Bedford, $11,000,000; Chicago, $11,000,000; New Orleans, $10,000,000; Manchester, $10,000,000; Troy, $10,000,000; Rochester, $10,000,000.

The average wages of sewing girls in Dublin, Ireland, are 75 cents a week.

THE

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☞ "The American News Company," Agents, 121 Nassau street New York.

VOL. XIV., No. 6...[NEW SERIES.]..*Twenty-first Year.*

NEW YORK, SATURDAY, FEBRUARY 3, 1866.

Contents:

(Illustrations are indicated by an asterisk.)

Every man who has money to invest always desires to place it where it will make the best return. This being admitted, we undertake to say that $3, invested in the SCIENTIFIC AMERICAN, will return three-fold in the amount of valuable information which its columns supply. Mechanics, inventors, manufacturers, farmers—as well as every head of a family—will get, on an average, $10 worth of information from a year's number of this journal, and yet they can get it for the low sum of $2 50, in clubs of ten names.

Talk about high prices—here is something cheap enough to stop the mouths of all grumblers. Only think of it—a large volume of 832 pages, full of costly engravings, for $3, and less to clubs. If any of our readers think we can get rich at such prices, let them try the experiment. Send in your clubs and subscriptions.

THE CHOLERA COMING.

Next summer we are to have the cholera. Its course so far has been just the same as its course in previous visitations, and next summer it will be due in this country. Thousands of the inhabitants of New York will be in the full vigor of health one day, and the next will be hastily borne to their final resting place. A universal panic will seize upon our people; all who can get away will flee from the pestilence; business will be prostrated; and general gloom and stagnation will take the place of our present prosperity.

And yet, all this can be prevented. There is no necessity for the prevalence of the cholera in this city next summer. While the causes of most diseases are hidden from knowledge, the cause of cholera has been positively ascertained. It is filth. The proof of this is conclusive. The progress of the disease in its several epidemics has been carefully watched and faithfully recorded; its history is remarkably full and minute; and, without exception, it has attacked filthy cities only, and it has prevailed only in the filthy portions of the cities which it has attacked.

We have before us a report made to the Citizens' Association of New York, by their Council of Hygene and Public Health, on the subject of the cholera. This council is composed of the leading physicians of the city—men of the very highest position for learning and character—and their report treats the subject with the masterly ability which was to be expected. It traces the progress of the cholera in each of its visitations, and shows that in all places the one cause of its prevalence was want of cleanliness.

The following are a few among the numerous facts cited in proof of this:—

"In the city of Buffalo, where there was fearful mortality from the epidemic of 1849, its principal ravages were witnessed in the filthy and undrained sections of the city, and in the purlieus of poverty, vice, and fevers along the canal. In Sandusky, where nearly one-third the resident population died in a single month, Dr. Ackley states that a stench pervaded the streets. At Louisville, Ky., the centers of the epidemic were associated with filth, malaria and crowding. In Cincinnati, where the epidemic killed 5,314 persons, out of a population of 116,108, it was first associated with local filth and crowding. In St. Louis, 4,557 inhabitants perished out of 50,000. Dr. McPheeters reported that the epidemic elected as its chief centers the crowded tenant buildings, the streets and dwellings alongside the stagnant ponds and open ditches that then abounded in that city; also that seven-tenths of the mortality was among the German and Irish population. In New Orleans, when the epidemic appeared, the streets and gutters were filled with filth so that even the Board of Health declared that "the elements of putrefaction had accumulated fearfully in every direction, until the atmosphere was polluted by poisonous exhalations in which a sickly acid smell predominated."

The report then cites numerous proofs that by proper attention to cleanliness, the pestilence may be avoided; we select two of these:—

"In various towns and cities of England, the actual benefits of preventive measures, the sanitary works of cleansing, drainage and ventilation, have been fully tested. For example, the city of Worcester, on the river Severn, having been twice scourged by cholera, undertook to avert the later epidemics by means of effectual cleansing and efficient sanitary regulations. The result was, that while the pestilence swept through the neighboring cities and villages, the populous city of Worcester escaped, "and the destroyer of uncleanly cities made a passover with the people of Worcester, for on every lintel and door-post was written, 'cleanliness, cleanliness.' Not a house was entered, and the town was saved in the midst of the most frightful desolation."

"In Philadelphia the cholera broke out and made some progress in the districts of Moyamensing and Southwark, where the work of cleansing was incomplete. But the citizens had anticipated the coming pestilence by the most comprehensive and energetic effort to effectually purge their city of all nuisances, and all the known causes that produce or localize disease; 2,970 privies were cleansed; 340 houses were cleaned by authority; 188 ponds were drained; 66 rag and bone shops were closed, etc., and in all the city removed upward of 6,000 separate sources of nuisances and disease. Cholera sent but 474 persons to their graves in Philadelphia, while in the city of New York it claimed 5,071 dead."

Is there not in this energetic community, sufficient energy, is there not among this provident people enough provident spirit, to arouse us to take hold of the work, and avert this awful pestilence, when it can be so surely done?

RECIPROCITY WITH THE CANADAS.

It is represented in one of the morning papers that the committee on reciprocal relations with the Canadas have nearly agreed upon a basis for a new treaty.

The people of the States have no unkind feelings toward the Provinces, and will not oppose any well-adjusted system of reciprocity. We only need to be assured that the treaty is really one of reciprocity, and no opposition will be made to its ratification. We desire to call the attention of the committee having the matter in charge, to the importance of securing, among other things, reciprocity in regard to patents.

The Canadian Patent Law is now the most illiberal in existence, requiring, as it does, that all applicants for patents shall be resident subjects as well as inventors of the things for which patents are sought. This practically excludes our citizens from the benefit of the law, and leaves our neighbors over the line free to appropriate our inventions without let or hinderance. Efforts have been made, from time to time, to secure an amendment to this unjust law, but to no purpose.

We have been regularly consulted, for years past, in reference to a bill to amend the Canadian patent laws, so as to open the door to inventors of all countries, but our advice has been wasted upon a set of sharp legislators who evidently preferred to allow their people to help themselves to whatever valuable inventions they could pick up on this side of the line. Now, inasmuch as there seems to be no prospect of getting a reciprocal law, let us, by all means, secure it by reciprocal treaty. We trust that the committee will not overlook this important subject.

EXHIBITORS AT THE FRENCH FAIR.

Mr. James W. Tucker, a citizen of the United States, but for many years past doing business as banker and commission merchant at No. 13 Faubourg, Montmartre, Paris, is now on a visit to this city, and intends to offer his services to all those who propose to exhibit at the approaching French Exposition. We have known Mr. Tucker for many years, and can vouch for him as a gentleman of high character. Every thing indicates that the exhibition is to be one of the wonders of the world. And it is especially important to those of our countrymen who intend to send articles for exhibition, that they should have a good representative in Paris—one who thoroughly understands the country and its language. Mr. Tucker may be addressed to the care of W. A. & M. White, No. 63 Broadway.

PETROLEUM AS FUEL.

On another page we publish an illustration of a new plan for burning petroleum by mixing it with steam. In connection with the illustration is a statement by Mr. Julius W. Adams of an experiment conducted by him, which gave a result of 29¼ pounds of water evaporated from a temperature of 60° with one pound of petroleum: equal to 32,820 pounds of water raised one degree of Fahrenheit's scale, or 18,233 pounds raised one degree of the centigrade scale. In the delicate experiments of Favre and Silberman, where the whole heating power of the fuel was utilized, it was found that pure hydrogen gas would heat only 34,462 times its weight of water one degree, C., while hydrocarbons, similar in constitution to petroleum, heated only 11,858 times their weight of water one degree, C. As in Mr. Adams's experiments, a large portion of the heat generated was wasted by passing out of the chimney, and by radiation, it would be satisfactory to receive a more minute account of the methods by which he reached his astonishing results.

PROSPERITY AND ADVERSITY OF INSURANCE COMPANIES.

The insurance companies of this city received during the fiscal year ending June last the enormous sum of $27,513,582 for premiums on the policies issued from their offices. This amount does not include the great number of offices in Brooklyn, Hartford, Philadelphia and other places, who have agencies in this city, which would swell the amount many millions more.

Notwithstanding this apparent prosperity of the insurance business in this city, the losses during the year preceding July, 1865, were immense. The Columbian Insurance Co., notwithstanding its annual receipts of upward of four millions for premiums, has been obliged to succumb within a few days, owing to the immense marine losses sustained by it.

SOME of the oil companies of Pennsylvania make a deplorable exhibit to the Auditor-General. The law requires them to assess their stock at a valuation so that the tax can be adjusted. The same stock which a few months ago was represented to be cheap at ten dollars per share, is now valued by the same directors at five cents per share, and at this last assessment many of the taxes are computed and paid.

ISSUED FROM THE U. S. PATENT OFFICE

FOR THE WEEK ENDING JANUARY 23, 1866.

Reported Officially for the Scientific American.

☞ Pamphlets containing the Patent Laws and full particulars of the mode of applying for Letters Patent, specifying size of model required and much other information useful to inventors, may be had gratis by addressing MUNN & CO., Publishers of the SCIENTIFIC AMERICAN, New York.

52,120.—Process for Desulphurizing Ores.—John Absterdam, New York City:

I claim the within-described process of roasting or smelting metallic ores in vacuo, substantially as set forth.

52,121.—Process for Refining Iron and Steel.—John Absterdam, New York City:

I claim the above-described process for refining iron or making steel in vacuo, substantially as set forth.

52,122.—Horse Rake.—Daniel G. Adelsberger, Emmetsburg, Md.:

I claim connecting the rake-teeth of the machine with the main or revolving axle-shaft, F, through a connecting rod, q, wheel, V, vertical lever, Z, and sliding clutch, Y, of the shaft, T, geared or otherwise properly connected with the said axle shaft, all arranged and operating together substantially in the manner described and for the purpose specified.

[An illustration of this invention appeared in No. 4 of the present volume of SCIENTIFIC AMERICAN.]

52,123.—Plow Clevis.—Loyal W. Alden, Fosterville, N. Y.:

I claim, in combination with the sectional plates and springs pivoted at their rear to the beam, and made adjustable thereto at their front ends, the equalizing bar connected thereto, substantially in the manner and for the purpose described.

52,124.—Water-proof Fabric.—Reuben G. Allerton, New York City:

I claim the water-proof fabric, formed in the manner specified.

52,125.—Curb Bit.—William C. Baker, New York City:

I claim the application of a spiral spring to the cheek piece of the curb bit, in combination with a movable, sliding, driving eye, the whole constructed, attached and operated substantially in the manner hereinbefore described.

52,126.—Carriage Top Prop Block.—William N. Barnett, Urbana, Ohio:

I claim carriage top prop blocks, made as described above as an article of manufacture.

52,127.—Sugar Mill.—George Bevitt, Madison, Wis.:

First, I claim the combination and arrangement of the bar, E, and spring, d, for supporting the rollers, C and D, as shown and described.

Second, I claim the scraper, o, constructed as shown and described, and arranged to operate in connection with the rollers, C and D, as set forth.

52,128.—Billiard Cue.—George Bevitt, Madison, Wis.:

I claim securing a leather to a billiard cue, by means of a split conical-shaped screw plug, in combination with a proper shaped ferrule, attached to the cue, substantially in the manner described.

52,129.—Mode of Combining Photographic Lenses.—Charles B. Boyle, New York City:

I claim the system of combining lenses in geometrical ratios, of each other as described and set forth on the foregoing and accompanying drawings.

52,130.—Spoke Machine.—R. H. Boynton, Oshkosh, Wis.:

I claim the rotating cutters, u u, bent levers, 4 4, lever, m', and cam-shaped pattern, S, arranged with reference to each other and to the endless bed or chain, y, substantially as and for the purpose herein set forth.

52,131.—Hand Saw.—R. Moss Breckinridge, Meriden, Conn.:

I claim securing the saw in any desired position in the frame by means of the journals, E and G, revolving in rockets, D and H, to which the saw is attached, and in which are pins, a a a' a', fitting in notches, b b, and clamped in place by the screw, d, and nut, e, when arranged and constructed substantially as described.

52,132.—Method of Disintegrating and Desulphurizing Gold, Silver and Copper Ores.—Frank F. Brower and George C. Campbell, Ottawa, Ill.:

We claim the within-described method of disintegrating and desulphurizing ores found in combination with quartz or silver, by smelting them in combination with carbonate of soda or other suitable flux, and then precipitating the fused mass into water, substantially as described.

52,133.—Process for Treating Fur.—Alfred C. Brush, Darien, Conn.:

I claim the process substantially as above described, for treating fur, wool and hair, and preparing them for felting or other purposes.

52,134.—Horse Hay-fork.—E. & A. Buckman, East Greenbush, N. Y.:

First, I claim the pivoted forks, B B, at the lower ends of the arms or levers, A A, connected to said arms or levers by rods e, to cause the forks to move automatically by the movement of the arms or levers, substantially as described.

Second, The bars, C C, connected to the pivot bolt, a, of the arms or levers, A A in combination with the rods, I I, fitted in the upper parts of the arms or levers, and having the hoisting rope and discharging ropes, G J, attached respectively to them, and all arranged to operate substantially as and for the purpose specified.

52,135.—Seeding Machine.—Henry Burdell, Dayton, Ohio:

I claim combining with the shafts, the sets of zig-zag channeled wheels and interposed agitating wheel, working in the hopper and in the sectional case and shield below the hopper, substantially in the manner and for the purpose described.

52,136.—Mop Wringer.—Mary P. Carpenter, Buffalo, N. Y.:

I claim the combination of a wringer with a mop, substantially as specified.

52,137.—Cotton Tie.—Wm. R. Carroll, Natchez, Miss.:

I claim the device or fastenings, d and E, constructed and arranged as herein-described and for the purpose set forth.

52,138.—Shoe.—Edwin Chesterman, Roxbury, Mass.:

I claim interposing a lining of hair, wool, felt, or some other material between the upper or outside and the usual lining of a boot or shoe, for the purpose of keeping the feet warm in cold weather, substantially as specified.

[This invention is particularly applicable to rubber boots and shoes, such, for instance, as Mr. Chesterman obtained a patent for on the 27th of June, 1865. The invention consists, as the claim indicates, in interposing a lining or filling of any suitable material which will retain the warmth of the feet, between the outside of the shoe and the inside lining usually employed. The felt, hair, wool, or other material may be properly distributed throughout the shoes, and it is claimed that this is better than placing a lining of fur or flannel next the stockings, as the tendency is often to sweat the feet instead of retaining their natural heat.]

52,139.—Safety Bridle.—Amos B. Christ and Henry H. Stehman, Manor Fork, Pa.:

First, We claim the combination of a strap, E, and roller, e f, with a safety strap, B, having one end affixed to the ring, A, of the bridle bit, and carried up over a roller, and then down through the ring, A, of the bit, to its connecting and retaining ring, D, in the manner and for the purpose specified.

Second, We claim a short elastic branch, L, attached to the ring, D, on the safety strap, B, when both branches are connected to the ends of an ordinary single line, in the manner and for the purpose specified

52,140.—Iron Holder.—Wm. B. Coates, Philadelphia, Pa.:

I claim the application of wooden strips, B, covered or faced with metal, C, riveted or secured to a fire-proof stay piece or pieces, A, for the purpose of handling hot or cold iron, the whole being constructed in the manner and for the purposes as already fully described and set forth in the foregoing specification.

52,141.—Sled for Children.—Jesse A. Crandall, New York City:

First, I claim, in combination with the sled, A, the use or employment of the secondary bed, B, when the same shall be constructed and combined, substantially as set forth and for the purpose specified.

Second, I claim constructing the secondary bed, B, and frame work to support the same in such a manner that the same may be readily converted into a chair for the purpose specified.

52,142.—Toy and Doll.—Frank E. Darrow and Deon E. Peck, Bristol, Conn.:

We claim the employment of raw hide in the manufacture of toy dolls, substantially as described.

52,143.—Anchor Tripper.—Edward Davidson, Providence, R. I.:

I claim the lever or arm, A, having a hook-shaped end, b, in combination with the button, G, arranged together and operating as and for the purpose specified.

[To facilitate and enable the heaving of a ship's anchor from the cat-head to be readily accomplished is the principal object of this invention, and it consists in a novel arrangement of a hook-lever upon the cat-head, upon the hook end of which one end of the chain by which the anchor is suspended from the cat-head is hung, while the other, passing over a suitable pulley of the cat-head to the deck of the vessel is drawn or hauled in by any proper means, thereby raising the anchor, which, when at the desired hight is there held by the use of a suitable chain stopper for bolding the chain.]

52,144.—Manufacture of White Lead.—Clarence Delafield, Staten Island, N. Y.:

First, I claim manufacturing white lead by the use of the above-described chemicals or their equivalents, for this purpose so combined, applied or united as to yield saltpeter as a residue of the process.

Second, I claim the use of the above-described chemicals, or their equivalents for this purpose, when so combined, united or applied as to produce the white lead of commerce.

Third, I claim manufacturing the white lead of commerce by substituting the above-described process.

52,145.—Manufacture of Saltpeter.—Clarence Delafield, Staten Island, N. Y.:

First, I claim manufacturing saltpeter by the use of the above-described chemicals or their equivalents for this purpose, so combined, applied or united as to yield white lead as the residue of the process.

Second, I claim the use of the above-described chemicals or their equivalents for this purpose, when so combined, united or applied as to produce the saltpeter of commerce.

Third, I claim the manufacture of the saltpeter of commerce, by substantially the above-described process.

52,146.—Cradle.—Alexander Dick, Buffalo, N. Y. Antedated Jan. 17, 1866:

I claim the arrangement of the cradle basket, B, the hoop, C, the screw, N, the bearer, O, the pivots, P P, and the frame, A, substantially as and for the purpose specified.

52,147.—Powder-flask Charger.—Clement C. Dickey, Philadelphia, Pa.:

I claim the combination of the nozzle, C, connected by the trunnions to supports, D, the valves, E and b, and spring, g, all arranged and constructed to operate as and for the purposes described.

[This invention consists in mounting the charger on a trunnion, which works in a suitable support, arranged on the top plate or cap of the flask, so that the same will turn freely in such manner as to permit the insertion of its end in the muzzle of the gun, and at the same time, in order to discharge its contents therein, make it necessary to turn the flask in a horizontal position and thus bring the hand away from over the muzzle of the gun, so as to prevent injury by a premature discharge.]

52,148.—Boring or Drilling Tool.—Lorenzo Dow, Piermont, N. Y. Antedated Jan. 10, 1866:

I claim attaching the diamonds or other stones which constitute the cutters of the boring tool to the stock, by soldering, brazing or otherwise securing the settings of the said stones into removable blocks of steel or other hard metal, which are dovetailed or otherwise secured in the stock, substantially as herein described,

52,149.—Manufacture of Wrought Iron directly from the Ore.—Charles M. Dupuy, New York City:

I claim the process of obtaining wrought iron from ore by subjecting them to heat when mixed with carbonaceous matter and charged in iron canisters, which latter are welded up and balled together with their contents, the process being conducted substantially in the manner described.

52,150.—Operating Gun Carriages.—John Ericsson, New York City:

First, I claim a rotary compresser composed of a series of metallic disks secured to a shaft provided with pinions, which pinions, by means of toothed racks, check the recoil of cannon, said metallic disks being contained within a cog wheel which revolves freely on the said pinion shaft, and to which said cog wheel is secured a series of disks composed of wood or similar material inserted between the metallic disks, substantially as described.

Second, I also claim the toothed rack, Q, pinions, P''' and P'', and cog wheel, F, or their equivalents, for changing the direction of the slide frame and pointing the gun, substantially as described.

52,151.—Apparatus for the Distillation of Tars and other Substances.—Levi S. Fales, Boston, Mass.:

First, I claim, in combination with a cooling chamber at or near the outlet of a retort between it and the ordinary condenser for the separation of the heavier from the lighter vapors eliminated in the distribution of tar and heavy oils and substances, the employment of means of regulating the supply or action of the cooling medium, substantially as herein described, whereby a uniform density of light oil is obtained.

Second, Increasing the cooling effect as the heat of the still is increased either by increasing the effective cooling surface or increasing the flow of the cooling medium, substantially as herein described.

Third, The arrangement of the cooling surfaces around or with in a dome or elevated chamber situated directly over the retort, and in such unobstructed communication therewith as to form, in effect, a portion thereof, substantially as and for the purpose herein specified.

52,152.—Horse Rake.—Charles H. Finson, Bangor, Maine:

First, I claim the combination of the teeth, arms, G, bars, E and F, and levers, c, as and for the purposes specified.

Second, The tilting device, as constructed, with levers, c, bars, E and F, and lever, g, when arranged to operate substantially in the manner and for the purpose specified.

52,153.—Roller for Wringers.—James B. Forsyth, Roxbury, Mass.:

First, I claim a roller in which the core is permanently secured independently of the shaft, and which, together with its core, can be removed from the shaft or attached to the same, substantially as described.

Second, The adjustable collars, b, in combination with the shaft or mandrel, B, tube or hollow core, A, and roller, substantially as and for the purpose set forth.

[This invention relates to certain improvements in rolls for clothes wringers or other machines, which rolls are made of india-rubber or other vulcanizable gum.]

52,154.—Buckle.—R. E. Frye, Manchester, N. H.:

First, I claim the combination of the frame, E E D, and sustaining bar, A, with the pawls, B, substantially in the manner and for the purpose set forth.

Second, I claim the combination of the sustaining bar, A, the pawl, B, and friction roller, C, substantially in the manner and for the purpose described.

[This invention relates to a novel construction of the biting or jamming parts of buckles, and consists in jamming the running part of a strap against a cross-bar or bed plate by means of a pawl, the face of which may be serrated or otherwise; and also in combining with such jamming pawl a friction roller, which comes into action as the pawl is elevated, and reduces the friction on the passing strap when it is being tightened or drawn through the buckle.]

52,155.—Wrench.—Edward P. Furlong, Westbrook, Maine:

I claim constructing a groove on the inner face of the jaws of a wrench, as and for the purposes described.

52,156.—Brick Machine.—Emery R. Gard, Chicago, Ill.:

I claim the continuously revolving spiral wing or wings, D D, when applied to a mold table or bed, F, which has a continual reciprocating motion communicated to it, by gearing or the equivalent thereof, substantially as and for the purpose herein specified.

I also claim the combination of the pins, v v, in the projecting stems of the followers, with the double ledges, w w, of the tracks N N, for the purpose herein specified.

52,157.—Ice Creeper.—Edward M. Gardner, Nantucket, Mass.:

I claim the improved ice creeper, constructed substantially as described, viz., of the flexible or elastic frame and the cloth covering, arranged together as specified.

52,158.—Railroad Car Truck.—John L. Gill, Jr., Columbus, Ohio:

First, I claim making a bolster recessed on each side, making a space to admit of the springs between the bolster and the bolster frame.

Second, I claim making a bolster recessed in the middle to admit of the springs, vertically, with one end attached to the bolster and the other to the bolster frame, as specified in the foregoing specifications.

Third, I claim the arrangement of bolster in combination with the half elliptic springs.

52,159.—Cultivator Plow.—James S. Gilmore, Millersburg, Ill.:

First, I claim the arrangement of the plow shanks, F F2 F3, square shafts, D H, adjustable clevises or arms E H', chains, J' I', cog wheels, K L, and lever, L', as and for the purpose described.

Second, I claim the arrangement of the shaft, O, curved bar, P, stirrups, Q Q, vertical arms, R, bar, S, uprights, S' S', curved bars, V V, and pins, t t, as and for the purpose specified.

Third, I claim the reversible lever, W, in combination with the shaft, O, and set screws, w, as described.

52,160.—Washing Machine.—Joseph S. Godfrey, E. S. Godfrey, and Russell Godfrey, of Leslie, Mich.:

First, We claim constructing the reciprocating rubbers, C and D, with stepped slatted surfaces, the slats of which are so arranged that they shall rub, squeeze, and roll the article between them, substantially as described.

Second, We claim the combination of the rubber, C, with a rubber, D, which receives a backward and forward movement and also a rising and falling movement, and which is held down at the proper time to squeeze the article by means of the strips, g g, substantially as described.

Third, We claim the combination of two reciprocating stepped rubbers, C and D, with the swinging supports, d d, and the holding down strips, g g, all arranged to operate substantially as described.

Fourth, We claim arranging the slats of the rubber, D, in planes, which are above the slats of the rubber, C, in combination with the holding-down strips, g g, substantially as described.

52,161.—Loom.—Oliver W. Gordon and Nathan T. Frame, Salem, Iowa:

First, We claim a device for communicating motion from the batten, C, to the picker staff, E, without the use of auxiliary pulleys, by means of the drivers, D, and flexible hinge, substantially as set forth.

Second, We claim constructing the harness shafts, G, and their uprights, g, and projecting ends, g' g'', as and for the purposes set forth.

Third, We claim raising and lowering both ends of the harness shafts, simultaneously, by a positive action, substantially as and for the purpose set forth.

Fourth, We claim the cylinders, F, so arranged as that their axes shall be at right angles with the planes of the harness shafts, and by means of pins thereon, giving a positive motion both ascending and descending to the harness snafts.

Fifth, We claim the combination of the batten, C, the cord, I, lever and ratchet, H, with the cylinder, F, substantially as and for the purpose set forth.

Sixth, The removable guide, L, in combination with the harness and shafts, G, having eyes or their equivalents, for such guides, constructed and arranged substantially as and for the purpose set forth.

Seventh, We claim the arrangement of the cases, B, and the pawl and lever, X, and ratchet, H, cylinder and harness shafts, constructed and combined substantially as set forth.

52,162.—Coupling for Shafting.—Lyman Gray, Pittsburgh, Pa.:

I claim the application and use of two or more pawls, within a metallic sleeve, arranged at such an angle to the axis of the shaft or shafts, that one end of each pawl presses against and bites in to the periphery of the shaft or shafts, so as to prevent their rotation in either direction within the sleeve when in use.

52,163.—Paper Collars.—Solomon S. G. Gray, Boston, Mass.:

I claim a paper or paper and cloth turn-over collar, with a curved or concave bottom, and turned over on a line curved in the same direction, substantially as and for the purpose set forth and described.

52,164.—Drill for Wells.—John Grieves, Brooklyn, N. Y.:

First, I claim the drill constructed of the two curved pieces, A B, and trimming bit, D, combined, substantially as herein described.

Second, The casing, F, in combination with the portions, A B, of the drill, substantially as and for the purpose herein set forth.

Third, The valve box, H, constructed and applied to secure the drill to the tubular rod and to secure the casing, F, substantially as herein described.

52,165.—Cartridge Retractor for Revolving Fire-arms.—Henry Hammond, Bridgeport, Conn.:

I claim the cartridge shell extractor for revolving fire-arms herein described, consisting of an external sleeve or thimble fitting over

the cylinder and down behind the rim of the cartridge and sliding on the cylinder, substantially in the manner herein set forth.

52,166.—Washing Machine.—John J. Herrick, Horicon, Wis. :

I claim the combination of the shaft, link and staples, and the standard to the crank shaft or windlass, whereby the shaft and movable wash-board is moved forward and backward, as specified.

52,167.—Reaping and Mowing Machine.—L. B. Hoit, Cedar Falls, Iowa :

First, I claim the cam, F, provided with oblique wings or flanges, g g', arranged as shown, to impart a reciprocating motion to the sickle through the medium of the link and pitman, and at the same time cause the latter to be automatically thrown out of gear with the cam, at either side of the same when the machine is backed, substantially as described.

Second, I also claim the yoke or levers. D, employed to so connect the finger bar, E, and cam, F, that the latter will partially counterbalance the former.

Third, I further claim the combination and relative arrangement of the raising lever, K, yoke, D, cam, F, and finger bar, E, to facilitate the elevation of the cutting apparatus and adapted to be raised to any hight without throwing it out of gear.

[This invention relates to a sickle-driving mechanism whereby several very important results are attained, viz., the finger bar and sickle are placed in a balanced state, so that they may be raised with facility whenever required, and allowed to conform readily to the inequalities of surface over which they may pass. The sickle-driving mechanism also favoring the draught of the machine and possessing the advantage of throwing the fulcrum out of gear automatically whenever the machine is backed, so that there cannot be any motion of the sickle during a retrograde movement of the former.]

52,168.—Harvester.—Chester C. Holman, Clayville, N. Y.:

First, I claim the frame, A A' A'', constructed as shown and described and used, in combination with the reversible brace frame, C, and shoe, O, as specified, whereby the cutting mechanism may be operated on either side of the machine, as herein described.

Second, I claim the connecting brace frame, C, with the pinion, d, spring catch, f, cord or chain, g, foot lever, G, and segment lever, F, arranged and operating in the manner, and for the purposes specified.

Third, I claim the shoe, O, and roller, q, constructed as described, in combination with the connecting brace frame, C, and the cutting mechanism, D, substantially in the manner and for the purpose herein set forth.

Fourth, I claim attaching the pole or tongue, L, to the upright portion of the frame, A, which is in advance of the brace frame, by means of the lugs, c c, pivot, e, stirrup, b, and spring, r, arranged in the manner shown and described.

Fifth, The employment of the converging spur gear, or ratchet wheel, Q, with its pawl, S, arm, t, spring, u, and pin, W, arranged as described, for connecting and disconnecting the driving wheels with the working mechanism.

52,169.—Marking Wheel.—Horace Holt, Brooklyn, N.Y.:

First, I claim the combination of the type wheel, A, inking roller, C, and ink reservoir, c, all constructed, arranged, and operating as specified.

Second, The yielding flanges, b, on type wheel, A, constructed and operating substantially as and for the purpose described

Third, The spring, g, applied in combination with the type wheel, A, steed, h, and pin, i, or their equivalents, substantially as and for the purposes set forth.

52,170.—Coupling for Carriage Thills.—James Howarth, Monroeville, Ohio:

First, I claim the plates, A and B, and clutch, G, in combination with the bolts, E h, when arranged as and for the purpose substantially as set forth

Second, I claim, in combination with the above-described construction, the heads, A B, concaved, and the bar points, b b, all arranged as shown, for the purpose specified.

52,171—Hand Corn Planters.—D. H. Howell, Independence, Iowa:

I claim the reverse cranks, d d, on the shafts, E E, provided respectively with the cups, G, and handle, F, and arranged substantially as shown, with the box, B, having the seed-conveying tubes, A A, attached, to operate in the manner as and for the purpose set forth.

[This invention relates to a new and improved hand corn planter and it consists in the employment or use of the seed-conveying tubes arranged with seed boxes and a seed-distributing device, and all constructed in such a manner that the device may be manipulated with the greatest facility, and two rows of corn planted simultaneously.]

52,172.—Fruit Ladder.—Sidney Hudson, Milford, Mich.:

First, I claim tapering ladder, H, the sides of which are brought to a point, as and for the purpose herein shown and described.

Second, I claim the extending of pointed ladder, H, by connecting its lower end to the upper end of a corresponding tapering ladder, R, by suitable couplings, as and for the purpose herein shown and described.

Third, I claim platform, A, which consists of two steps at right angles, with four adjusting hooks, as and for the purpose herein described.

52,173.—Tool for Making Lighters.—Albert Kleinschmidt and Francis Schlater, Philadelphia, Pa.:

We claim the within described-plane, with its longitudinal groove, e, diagonal cutter, B, and diagonal groove, f, the whole being arranged substantially as and for the purpose herein set forth.

52,174.—Bits for Boring Holes.—Charles F. Kimball and Alex. Parsons, Portland, Me.:

We claim the combination of the part, A, having the hole and knives, r and f, as described, with the screw, B, the nut, d, and the gage, c, all as and for the purposes specified.

52,175.—Grain Binder.—J. Lancaster, Baltimore, Md.:

First, I claim the band carrier, M, constructed of two parts connected by a joint, in connection with the cord carrier, R, arranged to operate in the manner substantially as and for the purpose set forth.

Second, I claim the sheaf presser, Y, in connection with the band carrier, M, and the wire twisting apparatus, consisting of the rotating cylinder C' E', all arranged to operate in the manner substantially as and for the purpose specified.

Third, The sliding plates, A, swing, B, comprising the gatherers, arranged to operate substantially as described and for the purpose set forth.

Fourth, I claim the sheaf dischargers, H' H', arranged to operate in the manner substantially as described.

Fifth, I claim the reciprocating bars, D P W A' F', arranged as herein described, to communicate motion to the various operating parts from a single driving shaft, K.

[This invention relates to a new and improved device for binding grain, and is designed for an automatic attachment for reapers, to operate in conjunction therewith, and gather up the cut grain as it is presented to the device, and bind it into sheaves, which are cast from the reaper as they are bound.]

52,176.—Suspended.

52,177.—Chimney Cap.—Peter Lear, Medford, Mass.:

First, I claim the combination as well as the arrangement of the stationary conical case, A, with one or more rotary wings, g, and a wind wheel, D, on buckle or cap applied to the spindle, C.

Second, I claim the combination as well as the arrangement of the support tube, B, with the stationary conical case, A, one or more rotary wings, g, and a wind wheel, D, applied to spindle, C.

Third, I claim the combination as well as the arrangement of the socket tube, F, applied, or to be applied, to the chimney with the support tube, B, the stationary conical case, A, and one or more rotary wings, g, and a wind wheel, D, arranged as specified.

Fourth, I claim the operation of the step bar, a, of the spindle to the support tube, B, when combined with a conical case, A, having one or more rotary wings, g, and a wind wheel, D, arranged with respect to it and applied to spindle, c, as described.

Fifth, I claim the application of the pivot-supporting bar, d, directly to the conical case, A, having one or more rotary wings, g, and a wind wheel, D, arranged and combined with it as specified.

52,178.—Belt Coupling.—Worley Leas, Kokomo, Ind.:

I claim a belt coupling composed of two parts, A A, of metal or other suitable material, bent or otherwise formed so as to have two parallel parts, a a, between which the ends of the belt are secured by rivets or screws, and having rounding edges, b, with recesses, c, made in them to form projecting portions, d, the latter of one part, A, fitting in the recesses, c, of the other, with a pin or pintle, C, passing through the portions, d, substantially as described.

52,179.—Eyelet.—Rufus L. Smith, Melrose, Mass.:

I claim the eyelet herein described as a new article of manufacture.

52,180.—Post-hole Auger.—Josiah M. Leeds and Joseph E. Hallowell, Kokomo, Ind.:

We claim a post-hole auger having its body, A, composed of spring metal, and with its cutting rod beveled as at f f1 f2, in combination with braces, B B, or their equivalents, substantially as described.

52,181.—Railroad Car Box.—George F. Lynch, Milwaukee, Wis.:

First, I claim the construction of railroad car boxes in two distinct but dependent parts, substantially in the manner and for the purposes herein described, set forth, and explained.

Second, The truncated ovoidal or elliptical form of the railroad-car box, substantially as herein set forth as described.

Third, The combination of set screw, Fig. 2, jam nut, Fig. 3, shock plate, Fig. 4, washer, Fig. 5, plate 3, and shock springs, Figs. 7 and 8, plate 2 (arranged substantially as herein described), in combination with railroad car boxes, to be constructed and operated as herein described and set forth.

52,182.—Barrel Head.—Joseph McCammon, Dayton, Ohio:

I claim the metallic piece, C, and disk, D, used in connection with the barrel bead in two parts, as and for the purpose herein specified.

52,183.—Lock.—M. McGonnigle, Alleghany City, Pa.:

I claim the use of two bolts which answer the double purpose of bolt and guards to the keyhole, which are arranged in the lock case so as not to come opposite to each other, as herein described and set forth.

52,184.—Cultivator.—Stephen G. Mills, Des Moines, Iowa:

I claim the arrangement of the double-shovel plow beams, F, standards, I, guides, J, chains, E, wheels, L, bridge, M, bar, C, lever, N, and slutting seat, R, substautially as described and represented.

52,185.—Washing Machine.—Alexander Mitchell, Fredericton, New Brunswick:

I claim a washing machine formed by combining the roller, O, covered with india-rubber or its equivalent, with the inclined washboard, G, the frame N, the cross piece, A, the springs, x, and v, the rods, R, and the treadle, S, substantially as described and for the purpose set forth.

[The design of this invention is to furnish a machine so constructed that the force to be applied to the articles being washed may be regulated at will to correspond to the delicacy of the fabrics. The machine is operated by a treadle in connection with springs, and the washing is done by passing a roller up and down the surface of an inclined washboard. The washboard is removable and is made plane, or fluted or covered with rubber, as may be required by the quality of the articles washed.]

52,186.—Hay Fork.—J. A. Montgomery, Williamsport, Pa.:

I claim the combination of the tines, A, bent as described, band, B, and plate, E, substantially as and for the purpose described.

51,187.—Thill-holding Loop.—William Morley, Rolfe, Iowa:

I claim a metallic thill-holding loop, A A, constructed substantially as described, and the suspending of the same between two parts of a suspending strap, E E, substantially in the manner and for the purpose set forth.

[This invention relates to a new and useful thill holding loop for harness, and also to an improved mode of suspending the same, whereby a saving of labor and material is made, and a loop produced which is more durable and snug, and much more neat in appearance than the ordinary loops now in use. It consists in a metallic loop which is provided at its top and bottom with strap guides, and on its sides with fixed tongues which engage with the suspending straps, the loop being suspended between two parts of the suspending straps in such a manner as to be adjustable therein and without impairing the strength of the suspending straps, but leaving the two parts of the same at their full strength.

52,188.—Feed Rollers to Circular Saws.—John Mutty, Brewer, Maine:

I claim the grooved smooth-faced cylinder feed roller when used singly to feed the wood to be sawed to a circular saw, and revolved by the means substantially as described and for the purpose set forth.

52,189.—Hollow Grate Bars for Furnaces.—G. S. Nevins, Bushnell, Ill.:

First, I claim in furnace and other grates, securing the ends of their bars together by means of rods passing through hollow spaces made through said bars, so as to allow the bars to expand and contract without breaking their joints, substantially as shown.

Second, I also claim in tubular grates, placing a copper gasket, between adjacent bars, each alternate gasket fitting close about the rod which connects the bars to each other, so as to form a continuous water course, substantially as shown.

Third, I also claim connecting the discharging pipe, i, of the grate with the top of the water reservoir from which the hollow bars of the grate are supplied with water, so that steam and hot water may pass over into the reservoir without obstruction, preventing the bars from becoming filled with steam and being blown empty, substantially as set forth.

52,190.—Loading Attachment to Hay Wagons.—W. B. Niles and S. M. Gillett, Little York, N. Y.:

We claim the crane placed on a mounted frame, A, arranged with an adjustable step so that it may be kept in a vertical position, in combination with a fork, N, and rope or chain, M, arranged with the crane and attached to a pulley, D, on the axle, C, to operate in the manner substantially as and for the purpose set forth.

52,191.—Apparatus for Desulphurizing Ores.—Butler G. Nobie, New York City:

First, I claim the shower chamber, k, in combination with the desulphurizing chamber, f, substantially as and for the purposes set forth.

Second, I claim the mode of constructing the desulphurizing chamber, f, with the inclined grate, d, and discharge door, g, as set forth in combination with the shower chamber, k, as specified.

Third, I claim the adjustable steam tweer in combination with the desulphurizing vessel, constructed as specified, so as to regulate the temperature as set forth.

52,192.—Looms.—Benjamin Oldfield, Williamsburg, N. Y. Antedated Jan. 7, 1866:

I claim the application to a batten of two or more shuttles for plain weaving and one or more figuring shuttles, to operate in conjunction, substantially in the manner, and for the purpose herein set forth.

[This invention relates particularly to looms for weaving figured goods, and it consists in the arrangement of two or more shuttles for carrying the plain part of the weft, and one or more shuttles for carrying the figured part of the weft, in such a manner that the shuttles which form the plain part are drawn simultaneously through the same opening in the warp or shed, and the figured shuttle or shuttles are moved at such intervals, as the pattern may require, and that by driving two or more plain shuttles simultaneously through the same opening, much time is saved and stronger and heavier goods can be produced at less expense than on looms of the ordinary construction.]

52,193.—Flyer Boards of Spinning Frames.—Oliver Pearl, Lawrence, Mass.:

I claim a flyer board, occupying a position above the level of the top of the frame or above the depression made in the top of the frame for the purpose of preventing waste or locks of cotton from entering the nose of the flyer.

52,194.—Low Water Dectectors.—Milo Peck, New Haven, Conn.:

I claim the arrangement of the double cylinder, B D, in combination with a spindle, B, and a fusible metal, F, to operate substantially in the manner as herein set forth.

52,195.—Binding Attachment to Reaping Machine.—T. W. Peirce, Minneapolis, Minn.:

First, I claim the fixed tube, V, in connection with the sliding tube, W, and the expanding tube, B', arranged to operate in such a manner as to compress the gavels, and admit of the bands being adjusted on them, sustantially as set forth.

Second, The revolving rake, C', in combination with the tubes, V W B' substantially as and for the purpose specified.

Third, The frame, N, when used in connection with the tubes, V W B', and rake, C,' and operated in the manner substantially as and for the purpose set forth.

Fourth, The springs, Y, applied to the tube, W, and arranged to operate in the manner substantially as and for the purpose specified.

[This invention relates to a new and improved raking and binding attachment for reapers, whereby the grain as it is cut is raked up, and gavels of proper size are bound into sheaves.]

52,196.—Traveling Bag.—Victor Percheron, New York City:

First, I claim the folding crossed legs, E, pivoted in a frame, D, and thereby attached to a traveling bag or satchel, substantially as set forth for the purpose specified.

Second, The straps, d, applied to a traveling bag or satchel when such bag is provided with folding legs all substantially as set forth for the purpose specified.

52,197.—Vacuum Pan for Condensing Milk and Other Substances.—George R. Percy, New York City:

First, I claim the combination of the shell, A', with the series of pipes f f, the feeder, a, the connecting tubes, g, suostantially as described in vacuo.

Second, The combination of the feeder, a, with the shell, A whether with or without the pipes, f f, when used in vacuo.

Third, The combination of the ordinary vacuum condensing pan, with the percolating, trickling and heating apparatus as above described.

Fourth, The introduction of, into a vacuum pan of liquids in drops, small particles or their sheets, when for the purpose of evaporation or condensation in vacuo, and when used in combination with a direct heating surface and not one formed by radiation, and the liquor to be condensed or evaporated running a trickling over such heated surfaces.

Fifth, The method or mode as above described of evaporating and condensing in vacuum at low temperature.

Sixth, The percolating, separating description and disintegration of substances as above described.

Seventh, The production and application of a uniform rate of temperature in and to substances while undergoing evaporation and condensation in vacuo, by means of their running or trickling over a surface of pipes or metals heated by the direct application of steam, hot air, or hot fluids to said pipes or metals above described.

52,198.—Sheep Rack.—David L. Pettigrew (assignor to himself and Jacob Smith), Claremont, New Hampshire:

I claim the above described rack for feeding sheep as a new article of manufacture, substantially as set forth.

52,199.—Straw Cutter.—Thomas J. Price, Auburn, Ky.:

I claim the series of circular revolving knives, C, and hinged rack or apron, J, for the purpose set forth.

Second, in the described combination, the series of circular revolving knives, C, hinged rack or apron, J, and fingers.

52,200.—Support for Flower Pots.—Thomas Prince, Roxbury, Mass.:

I claim arranging a number of flower pots, B, upon a rod, A, passing through them, substantially as and for the purpose specified.

52,201.—Knob Latch.—Thomas B. Pye, Trenton, N. J.:

First, I claim the lever, F, with its sharp point, d, oscillation resting in an angle as shown and described, and so constructed as to pass in front of the hub, D, instead of in rear of the same, as and for the purpose set forth.

Second, The reversible latch bolt, C, arranged to operate in connection with the lever, h, and spring, f, for their equivalents, as herein shown and described.

Third, The spindle reduced or shown at, y, of Fig. 8, for the purpose of causing it to yield instead of the interior portions of the lock, and thus prevent burglars or others from forcing open the lock by means of the knob or spindle.

Fourth, I claim a bolt for locks having its body corrugated as shown in Figs. 2 and 5, for the purpose of making it strong and light.

Fifth, I claim forming the lock bolt by casting the head, E' with the ridge, x, and pins, m and n, on the flat, bar, E, as herein shown and described.

52,202.—Wine Press.—A. L. Raud, Chicago, Ill.:

First, I claim the box, A, provided with the perforated plates, A, and rollers, e, in combination with the drawer, E, all arranged and operating as and for the purpose set forth.

Second, the follower, D, having its under face grooved as shown and provided with the tubular handle, E, as herein set forth.

The screw, a, bar, s, and rod, c, all arranged as shown, and made detachable for the purpose of converting the press, from a hand to a power press, and vice versa, at will, substantially as herein described.

52,203.—Cider Mill.—John Redlein, Brooklyn, N. Y.:

I claim the scraper, E, made three sided and applied in such a way to the endless apron, b, as to enable the position of its edges to be changed, substantially as set forth for the purposes specified.

52,204.—Pump Filter.—S. D. Richardson, and T. S. Hughes, Syracuse, N. Y.:

First, I claim the tube, A, running up into the chamer, B, with the parts, v u r and b, attached thereto.

Second, the same parts described in said claim, in combination with any form of pumps in common use, made and operated substantially as and for the purpose described.

52,205.—Grape Trellis.—Daniel T. Rickey, Marshalltown, Iowa:

I claim the hinge joint, F, as applied to the grape trellis, substantially as herein described.

52,206.—Steam Blower.—Alexander R. Rider, Hydeville, Vt.:

I claim so applying one or more steam pipes in connection with a rotary pan-blower, that the rotary motion will be produced by the infringement of steam upon its pans, and that such steam mixing with or bearing diffused among the air entering the blower, will be delivered along with said air into a furnace, substantially as herein described.

52,207.—Mill for Grinding Sugar Cane.—Thomas L. Roberts, Indianapolis, Ind.:

I claim so constructing a sugar mill, that the top roll may be lifted out with the journal boxes, by means of the handles, R, the journal boxes operating in the opening, G, of the frame, F, substantially in the manner and for the purpose set forth.

Second, I claim the adjustment of the scraper, L M S, when operated in the slot, S, by means of the set plate, O, and set screw, N, substantially as set forth.

52,208.—Wine Press.—James, Robertson, East Boston, Mass.:

I claim a portable wine press for family use, having a cross head, a, pillars, b b, with shackle hinges, a cylinder with India-rubber

bottom and gasket as described, together with two removable bottoms one of which is perforated, and the other grooved and the conduit therefrom, all arranged and combined substantially as herein specified.

52,209.—Obtaining Oil from Wells.—Otto Rotton, Brooklyn, N. Y.:

I claim an induction pipe for introducing water into the wheel to force up the oil, either by the static pressure of the water in said pipe, or by pressure mechanically applied, in combination with a vertically adjustable eduction pipe for the discharge of oil from the well, substantially as and for the purposes herein set forth.

52,210.—Hydraulic Jack.—Joseph Ryan, St. Louis, Mo.:

First, I claim the combination of a hydraulic cylinder, E, with a suitable base or bed plate, D, by means of a hinged support, E', substantially in the manner and for the purpose herein set forth.

Second, The combination of an adjustable brace, M, with a hydraulic cylinder, E, and base or supporting frame, D, for the purpose of staying the cylinder at any desired angle of inclination, substantially in the manner herein described.

Third, The combination of a suitable force pump, B, reservoir, C, and hydraulic cylinder, E, with each other and with a single supporting frame or base, D, substantially in the manner and for the purpose herein set forth.

Fourth, In combining and connecting a suitable force pump, B, with an adjustable hydraulic cylinder, E, by means of a jointed flexible pipe, substantially in the manner and for the purpose herein set forth.

52,211.—Library Step Ladder.—Charles C. Schmitt, New York City:

I claim the arrangement of a series of steps within any suitable frame, substantially as herein described and so as to operate as specified.

[This invention consists in a novel arrangement in connection with a suitable stand or frame, of a series of steps so that when not desired to use them, they can be swung or folded up into a very compact form within the said stand, and thus out the way, such an arrangement of steps, being especially intended for use in private libraries, drawing rooms, lawyers and other offices, as well as many other places in which a neat, convenient and compact step ladder is desirable.]

52,212.—Skate.—George B. Sennet and Henry Essex, Meadville, Pa.:

First, We claim the making of the foot rest and runner of a skate and without either weld, rivet or joint, out of one and the same piece of steel, substantially in the manner described.

Second, The forming of the heel-fastening or screw from one, and the same piece of steel of which the runner and the foot rest of the skate are made, substantially as described.

[This invention relates to the production of a skate, possessing great strength, elasticity, and beauty, and at a considerable less cost than skates as now manufactured, it consisting in forming both the runner and foot rest of the skate of one and the same piece of steel, by and through a novel mode of mampulating the said steel.]

52,213.—Cultivator.—Thomas N. Sherwood, Dunlapsville, Ind.:

First, I claim the lever, N, placed on the rear part of the draught pole, L, and connected by a rod, O, to a lever, E', at the rear of the bar, E, in combination with a staple, M, attached to bar, E, passing through the draught pole to receive the front end of lever, M, and the connecting of the rear end of the draught pole to the bar, E, by a hook, e, substantially as and for the purpose herein set forth.

Second, The rollers, K K, when applied to the device in front of the plows, substantially as and for the purpose set forth.

Third, The combination of the adjustable plow beams, B B C C, rollers, K K, wheels, P P, and draught pole, L, all arranged to operate in the manner substantially as and for the purpose set forth.

52,214.—Car Coupling.—George Shone, Carondelet, Mo.:

I claim the double inclined surfaces bed of the key way for the purpose of taking the key pressure upon axial line of the coupling, thus insuring a tight joint and making the efficiency of the coupling independent of the skill of the operator, as hereinbefore mentioned.

52,215.—Wood-splitting Machine.—John H. Silkman, Milwaukee, Wis.:

I claim in wood-splitting machines the arrangement of the working beam or helve, oscillating centrally on pivot, i, in post, H, between two splitting axes that are firmly fixed to said beam, when said beam is extended beyond one of the axes to receive the operating power, substantially as herein described.

52,216.—Ax for Wood-splitting Machines.—John H. Silkman, Milwaukee, Wis.:

I claim the splitting ax or wedge, when constructed as described, of parts, A A and B, and having the form substantially as described.

52,217.—Cultivator.—James B. Skiuner, Rockford, Ill.:

First, I claim the frame of a cultivator so constructed of two longitudinal pieces as to have its front constitute the tongue, while its rear extends behind the axle, to support the driver's seat and plows, substantially as set forth.

Second, Uniting the frame to the axle by levers arranged as described, in combination with the mechanism, substantially as described for rendering the frame rigid when raised to its greatest height, for the purpose set forth.

Third, The combination of the standards with the frame, the bent levers and tool levers, when arranged and operating substantially as and for the purpose set forth.

Fourth, The combination of the standards with the frame so that they shall be raised and lowered with it, and be capable of a sidewise and pivotal movement, and these with the mechanism, substantially as described, for locking the standards rigidly when adjusted for the purpose set forth.

Fifth, In combination with the standards, 3 and 4, the cross bar, I, ratchet bar, M, and the catchplate, i, and the catch hooks, 13 and 14, arranged and operating as and for the purpose set forth.

Sixth, The combination of the adjustable mold boards, R, with the standards and plows, substantially in the manner and for the purpose set forth.

Seventh, The combination of the doubletree, N, with the main frame and with the levers, P and P', arranged and operating substantially as described, for the purpose set forth.

52,218.—Saw Set.—Eli Smith, Winsor, Vt.:

I claim the combination of the pieces, C or C' F, or F E or E' E', and G or G', with a suitable frame or case, B, substantially in the manner and for the purpose described.

52,219.—Tenoning Machine.—H. B. Smith, Lowell, Mass.:

I claim, First, So arranging the cutter heads of a wood tenoning machine and upon the frame of the same, that while they can be set or adjusted to any distance apart, according to the thickness of the tenon to be cut, they can be, after such adjustment, either raised or lowered, as may be desired, and thus brought to any position with regard to the board or wood to be operated upon, without in the least degree disturbing their relative position with regard to each other, substantially in the manner described.

I also claim hanging the cutter heads in sliding frames, E and E2, of the machine, each having a screw shaft, R and U, with pinions, c and d, in combination with the swinging arm, V, and pinion gear, f, arranged with regard to the said pinions, c and d, and all arranged together so as to operate substantially in the manner and for the purpose specified.

52,220.—Scrubbing Machine.—Wm. T. Smyth, Philadelphia, Pa.:

I claim the combination of the brushes, C, with the top piece, A, and wheeled bed piece, constructed and operating substantially as described and for the purposes set forth.

52,221.—Cut-off Valves.—Robert Stewart, Elmira, N. Y.:

I claim, First, The valve crank, C, provided with corners, x, and arms, a, substantially as described, when used in combination with the pawls, G G', or their equivalents, and the weighted yoke, D d, or its equivalent, substantially as and for the purposes specified.

Second, The weighted yoke, d D D1 D2, constructed and operating substantially as described, and in combination with the arms, a, socket, E, and air chamber, D3, substantially as specified.

Third, The operating crank, F F1 F2, constructed and operating substantially as specified, in combination with the pawls, G G', and valve crank, C, for the purposes specified.

Fourth, the pawls, G G', constructed and operating substantially as described, in combination with the regulating yoke, H h, valve crank, C, and operating crank, F F1 F2, substantially as and for the purposes specified.

Fifth, The regulating yoke, H h, constructed and operating substantially as specified, in combination with the pawls, G o G' o, substantially as and for the purposes specified.

Sixth, The combined construction and arrangement of the weighted yoke, D, and valve crank, C, for the purpose of closing the ports, substantially as described.

Seventh, The arrangements of all the parts above described.

52,222.—Cultivator Plow.—Lafayette Strickland, Tallyrand, Iowa:

I claim the upright bars, H', attached to the plow frames, E E, and connected at their upper ends to handles, K, the front ends of which, as well as the front ends of the plow frames, are connected to the framing, D, by staple joints, substantially as and for the purpose specified.

Second, I also claim the adjustable plate, N, secured to the inner surfaces of the bars, H', in connection with the eyes or guides, F, arranged as shown, to regulate the depth of the penetration of the plows in the earth, as set forth.

I further claim the shoulders, i, attached to the rear sides of the bars, H', in connection with the spring catches, J, on the framing, D, for the purpose of holding, when required, the plows above the surface of the earth, substantially as set forth.

52,223.—Instrument for cutting Oilcloth.—Marcus A. Sunderland, Utica, N. Y.:

I claim the above-described foot, A, knife, B, and caster, E, the whole constructed and operated as and for the purposes above set forth.

52,224.—Water Wheel.—Frederick Swatzel, Germantown, Ohio:

I claim, First, the buckets, A A' A'', in combination with the inclined or curved spout, g, operating in the manner substantially as described.

Second, I claim the auxiliary buckets, e e, in combination with the wheel, as described.

52,225.—Combined Seed Drill.—Joseph Tedford, Hartford, Iowa:

I claim the combination and arrangement of the rotary digger, A, seed drills, D, hopper, L, roller, E, frame, G, and levers, N R R, as and for the objects herein set forth.

52,226.—Lock.—Chas. F. Toll, Boston, Mass.:

I claim the combination of the stopping pin, i, with the spring, h, and the pistons, f g, when applied to the two cylinders, C E, arranged in manner and to operate together as described. I also claim the combination of the connection screws, H' I, or their equivalent with the key, H, and the cylinder, E C D, and the pistons, f g, and spring or springs, h, the whole being made and applied together, substantially as specified.

52,227.—Watch.—Arthur Wadsworth, Newark, N. J.:

I claim holding the outer end of the hair or pendulum spring of time pieces, by and between a fixed shoulder or lip and an eccentric or cam, substantially as herein described and for the purposes specified

52,228.—Window.—Sigourney Wales, Boston, Mass.:

I claim the application of the connection bar, B, to the sash, by means substantially as described, viz: the parts, C D, whereby a lateral and a longitudinal movement of one with respect to the other, the two parts may be either connected or disconnected, under circumstances, and in the manner, and for the purpose as specified.

I also claim the arrangement and combination of the elastic or weather strip, b, with the sash and its connection piece, B, substantially as described.

I also claim the combination of the flap or part, b', with the rest of the weatherstrip and sash, and to operate in the recess, c, and with respect to the socket piece, c, in manner substantially as explained.

I also claim the construction of the window sash or its part, B, with the recess or groove, x x, and with the weather strip, y, applied thereto and so as to operate in the window frame, substantially as described.

52,229.—Carriage Seat.—Richard Walker, Batavia, N. Y.:

I claim the changeable carriage seat, a, hung upon the arms, c d, hinged near the bottom of the body of the carriage, and also hinged to the bottom of the seat, in combination with the guide irons, m m, roller, n, and the duplicate seat, b, all arranged substantially as described and for the purpose set forth.

52,230.—Self-locking Sail Board.—Sylvanus Walker, New York City:

I claim the combination of the hinged curved arms, D D, with the connecting rod, H, operating by their own weight as a self lock, by the notches coming in contact with the staples, e e', combined and arranged with a hinged tail board, substantially as set forth.

53,231.—Lamp Wick.—Benj. F. Walton, Philadelphia, Pa.:

I claim a wick composed of fibrous strands contained within an outer covering of paper, as set forth.

51,232.—Valve Gear for Steam Hammer.—James Watt, Buffalo, N. Y.:

First, I claim the bevelled arms, k k', made adjustable on the valve rod, and the tappet armor roller, f2, in combination with the piston rod for the purpose of operating the steam valve, substantially as described.

Second, Giving the cylindrical valve, G, a bearing, i2, against the valve chest opposite the posts in combination with the passage, i3, through the valve, to produce a balanced valve as described.

52,233.—Harrow.—M. D. Wells, Morgantown, West Va.:

I claim a harrow composed of a solid body or bed, A, rounded upward at its front end and having teeth, B, inserted in it, substantially as and for the purpose herein set forth.

I further claim in combination with the body or bed, A, having the teeth, B, inserted in it, the runners, C C, attached to the upper surface of A, with their rear ends projecting beyond the rear end of the harrow to form the handles, substantially as and for the purpose specified.

[The object of this invention is to obtain a harrow of simple construction which will effectually pulverize the earth, crush the clods of earth, and leave a fine mold upon the surface without disturbing or tearing up the sod where plowed sod ground is harrowed. The invention has further for its object the ready conveyance of the harrow from place to place.]

52,234.—Stencil Plate.—Jacob Wentz, Shelby, Ohio:

I claim the stencil plates in combination with the holder, when constructed and arranged in the manner described, being a new article of manufacture,

52,235.—Steam Oven.—J. G. Whitlock, New York City:

I claim, First, An oven heated by a coil of steam pipe arranged in a close coil at the lower part of the oven and in a more open coil at the upper part, so as to allow the pipes themselves to be used as shelves in baking, substantially as described and for the purpose set forth.

Second, Combining with the walls of the oven and with the coil of steam pipe an inner casing or lining so arranged as to produce a circulation of heated air within the oven, substantially as described and for the purpose set forth.

52,236.—Furnace Grate.—Charles Whittier, Roxbury, Mass.:

I claim hanging a series of grate bars loosely on one or more rods passing transversely through or under them, substantially as described, whereby the grate bars are allowed a free expansion from the center.

52,237.—Sorghum Cane Stripper.—Hulsey B. Wolf, Truro, Ill.:

I claim, First, The plate, A, with the spear-shaped part, B, substantially as and for the purposes described.

Second, The parts A, B, and C, substantially as shown and described.

Third, The parts, A, B, and D, substantially as shown and described.

Fourth, The parts A, B, C, and D, substantially as shown and described.

52,238.—Brand ng Tool.—J. P. Worrall, Philadelphia, Pa.:

First, I claim constructing the case, A, of a single piece, so arranged that the follower and type can be inserted or removed by simply loosening the handle, as herein shown and described.

Second, In combination with the frame made as above described, I claim the square-shouldered type, when arranged to operate in connection therewith, as and for the purpose set forth.

52,239.—Photographic Apparatus.—Nelson Wright New York City:

First, I claim suspending the entire back of the camera, substantially as herein specified, on pivots, p*, supported upon the carriage, c, which slides back and forth upon the bottom board of foundation, B.

Second, In combination with the carriage, T, of the plate holder constructed with grooved sides, v v, with a hollow rod, w, I claim the central rod, K, constructed extending downward right through and below the hollow rod and carriage and operating substantially as herein specified.

Third, Providing the developing trays and the baths for photographic purposes with sliding covers, so applied and furnished with means of attachment to the plate holder that the said covers may be slid off and drawn back to their places substantially as herein described by the application of the holder to the plate or bath, thereby allowing the plate to be transferred from the holder to the tray or bath, without exposure to the light.

Fourth, Furnishing the developing tray with a sight box, G, connected by means of a bellows-like extension, substantially as and for the purpose herein specified.

Fifth, Furnishing the bottom of the developing tray with elastic corner pieces, k' k', having their upper surfaces inclined toward the glass back, b', substantially as and for the purpose herein specified.

Sixth, The construction of the developing tray with one side, M g', movable substantially as herein described, to provide for the cleaning.

Seventh, The elastic lining, m, of the lid, in combination with the elastic lower corner pieces, k' k', substantially as herein described, for the purpose of holding the plate during the developing and washing processes.

52,240.—Machinery for Making Eyelet Blanks.—Solomon W. Young, Providence, R. I.:

I claim the combination and arrangement of the four punches, 1 2 3 and c, substantially as described, with a series of four or more equi-form dies, the same being constructed and operated by means substantially as described, for the purpose specified.

52,241.—Molasses Faucets.—Henry D. Blake (assignor to P. & F. Corbin), New Britain, Conn.:

I claim the combination in a faucet of the bent or curved arm, m, with the lever handle, c, arranged together and operating in the manner described, and for the purpose specified.

52,242.—Sash Fastening.—Isaac B. Cottrell (assignor to himself and Marcus D. Ball), South Orange, N. J.:

I claim the cams, D D, mounted upon weighted shafts, e e, so as to be operated in the manner described, and so arranged that while the two cams perform their respective functions of sustaining the upper and lower sash at any desired hight, the lower cam can be made to lock the lower sash when down, as set forth.

[This invention has for its object to produce a fastening to hold up window sashes when they are raised, and also to secure them from being opened from without, and it consists in applying, as a locking device, a weighted cam, whose face is corrugated, and which holds the sash when opened by contact with its adjacent side, the same cam serving to lock the lower sash when closed, by swinging over it, and to hold it up when it is opened.]

52,243.—Steam Generator.—Charles Henry Ford (assignor to himself, Hayward Hutchinson, Jesse L. Hutchinson, and Elias S. Hutchinson), Baltimore, Md.:

I claim the adjustable water-displacer, adapted to be raised and lowered within a steam boiler, substantially as and for the purposes set forth.

52,244.—Lathe for Turning Spherical Shot and Shell.—Charles Forster (assignor to himself and Robert C. Totten), Pittsburgh, Pa.:

First, I claim the use of the cup, h, in combination with the arch, z, connecting the head stock and tail stock of the lathe with or without the bracket, j, and screw, x', for securing the accurate centering of the shot or shell during the operation of turning.

Second, Also the revolving slide rest, p, operated by a worm and worm wheel, in combination with the cup, h, on the live spindle d, and the tapered mandrel, i, for fitting into the fuse-hole of shells, or the bit, m, with knife edges on its face for holding solid shot, the whole being constructed, arranged, and operating substantially as hereinbefore described.

52,245.—Brick Machine.—Joseph Grant (assignor to himself and Henry T. Grant), Providence, R. I.:

I claim placing the rollers, f, which work in the cam grooves, F, in different planes, substantially in the manner and for the purpose described.

52,246.—Hydrocarbon Stove.—A. J. Griffin, Lowell, Mass., assignor to himself and Wm. T. Vose, Newtonville, Mass.:

First, I claim the employment or use of a water reservoir within a stove, placed in such relation with a vapor burner that the water will be vaporized, and the steam decomposed by the heat from said burner, substantially as and for the purpose herein set forth.

Second, the vaporizing chamber, E, provided with partitions to form a sinuous passage, substantially as and for the purpose specified.

52,247.—Screw Cutting Chuck.—Francis H. Higgins, (assignor to himself and Alfred Thomson), Bordentown, N. J.:

I claim the within described cutter-head, composed of the section, a, with its cutters, and the section, a', with its cutters, the latter being hinged to the former, and the whole being constructed and combined with the locking spring lever, c, substantially as and for the purpose set forth.

52,248.—Revolving Fire-Arms.—Henry S. Josselyn (assignor to himself and W. E. Woodward), Roxbury, Mass.:

First, I claim in fire-arms an endless chain of cartridge chambers, arranged to rotate upon an axis, which is parallel with the bore of the barrel, and which has a series of sprockets that engage with the interspaces of the chain, substantially as shown.

Second, I also claim in combination, the endless chain, J, of cartridge chambers, the spring latch, c, and its arm, c, and the pin, E, of the hammer, substantially as shown.

[This invention consists in providing a fire-arm with a series of cartridge chambers connected so as to form an endless chain, which is carried upon a shaft, whose rotation is effected by the cocking of the hammer.]

52,249.—Mode of Sinking Tubular Wells.—Milton V. Nobles, Rochester, N. Y., assignor to himself and John C. Nobles, Rushford, N. Y.:

I claim, in combination with an external tube furnished with a series of holes, an inner tube without the holes connecting to a rod extending to the surface, by which said inner tube may be raised or lowered to cover or uncover said holes, and with a suitable pump valve, so that when water is reached it is only necessary to raise the inner tube and work it by the pump rod and the pump is complete, substantially as described.

52,250.—Process for Bleaching Fibrous Substances.—Joseph Short (assignor to himself, John J. Eckel, and Isaac S. Schuyler), New York City:

First, I claim the cold alkaline solution composed of the liquid potassa, spirits of ammonia, or chloride of sodium, about in the proportion specified.

Second, The bleaching of fibrous substances by first washing them in the alkaline solution, and then submerging them in the bleaching

liquid, composed of the ingredients herein named, and about in the proportion as specified.

[This invention relates to a new and improved process for bleaching fibrous substances, and is more especially designed for bleaching straw and flax and hemp fibre for paper stock.]

52,251.—Machine for Silvering Wood.—John Taggart, Roxbury, Mass., assignor to himself, J. H. Lester, and Charles D. Ellis, Boston, Mass.:

I claim the combination of the annular plane, D, provided with sheet and scoring cutters, as specified, with the stationary drum, G, or its equivalent, and one or more or a series of block holders, applied to such drum, substantially as described, the whole being to operate as and for the purpose set forth.

52,252.—Apparatus for Making Aerated Bread.—Robert Luke Howard, London, England, and John Danglish, Reading, England, assignors to Steuben T. Bacon, Boston, Mass.:

We claim combining the vessels, B and C, and apparatus connected therewith, substantially as herein described.

Also, the combination with a mixing vessel, B, of apparatus such as is herein described and shown for mixing the dough, reference being had to figures 2 and 6.

52,253.—Apparatus for Making Extracts.—James Miller, Upton, Canada East:

I claim the arrangement and combination, substantially as specified, of the elongated evaporator, A, the vessel, B, and the condenser, F, connected as explained, and the discharge pipe, z, the said condenser being provided with means of exhausting it of air and throwing water out of it, as and for the purpose hereinbefore explained, the whole constituting an apparatus for making bark extract as explained.

I also claim the combination as well as the arrangement of the vessel, C, the elongated evaporator, A, the vessel, B, the pipe, v, and the condenser, F.

I also claim the combination and arrangement of the partition, S, with the vessel, B, and the elongated evaporator, arranged and applied together as explained, such vessel, B, being provided with an escape pipe connected with an air-exhausting pump, or with the same and a condenser, as described.

52,254.—Machine for Setting and Distributing Printing Types.—H. W. Alden and W. Mackay, New York City:

First, We claim the conveyors, c d, in combination with the links, e16, d16, constructed and operating substantially as and for the purpose set forth.

Second, Giving to the conveyors a direct motion in the direction of the indicator points upon them by means substantially such as herein described, or any other equivalent means for the purpose set forth.

Third, The method herein described of compelling the conveyors, after they have been arrested, to overtake and reassume their original position on the carrier-wheel consisting of the lever, u24, and studs, u25, as specified.

Fourth, The mechanism, substantially as set forth, consisting of the arm, u29, and spring, c28, in combination with the lever, u24, and conveyors, c or d, or any equivalent thereof, for the purpose of moving said conveyors back at the proper intervals.

Fifth, The sectional flange, u17, on the carrying wheel, J, in combination with the pin, u16, projecting from the edge of the conveyors, applied and operating substantially as and for the purpose described.

Sixth, Placing the excavated rim on the outside of the conveyors instead of on the inside, substantially as and for the purpose set forth.

Seventh, The rail, j15, applied in combination with the conveyors, c d, and sectional excavated rim, m5, substantially as described, so that free access can be had to the conveyors, and the labor of making the excavated rim is reduced.

Eighth, The projections, K25 K26, on the pusher cord, K17, to operate in combination with the tilting lever, S7, and spring stops, s18 s19, substantially as and for the purpose set forth.

Ninth, The arrangement of cams, u15, on the under surface of the carrier wheel, J, to operate in combination with the levers, c20 d20, and pushers, c24 d24, substantially in the manner and for the purpose specified.

Tenth, The gripper springs, c18 d18, on the conveyers, in combination with the studs, u02 y31, and with suitable mechanism for pushing the types out of the type cases or channel, a, constructed and operating substantially as and for the purpose set forth.

Eleventh, The revolving receiver, R2, applied in combination with the carrying wheel, S, and conveyers, c d, substantially in the manner herein specified, so that the conveyors can deposit their type without stopping.

Twelfth, The type levers, z3, with quadrants, r4, in combination with segments, w43, and indicators, e7, constructed and operating substantially as and for the purpose set forth.

Thirteenth, The latch, ya, or any equivalent device, applied in combination with the type channel, ay, and the type levers, z3, substantially as herein described, whereby the types are pressed up against the edges of the type levers, instead of pressing said levers against the types.

Fourteenth, The sliding stop, c4, in combination with the type levers, z3, and with the channel, ay, constructed and operating substantially as and for the purpose described.

Fifteenth, The dog, u14, or its mechanical equivalent, applied in combination with the mechanism for transmitting the set of the type levers to the indicators, in such a manner that the indicators which are not to act on a certain conveyor are positively held until the convevor has passed.

Sixteenth, The apron, b4, and stud, b41, in combination with the sliding stop, c4, and type levers, z3, applied substantially as herein described, for the purpose of regulating the motion of said sliding stop, when a thin space is presented.

Seventeenth, Producing the set of the one class of conveyors from the inside and that of the other class from the outside, substantially as and for the purpose set forth.

Eighteenth, The rods, mo, with plates, Ko Kol, on one, and indicators, e7, on the opposite end, substantially as described, for the purpose of transmitting the desired set from the register wheel to the indicator points of the conveyors.

[An engraving of this really wonderful invention has ben published, in No. 2 of the current volume of the SCIENTIFIC AMERICAN. The machine is too complicated to admit of an explanation without a full set of drawings.]

REISSUES.

2,149.—Gas Holder.—Martin R. Cook, Jersey City, N. J., assignor by mesne assignments of S. Hill and W. S. Wood. Patented Nov. 6, 1855:

I claim, in gas holders for locomotive purposes, dividing the vessel into two compartments by an inclosed flexible diaphragm, or the equivalent thereof, when one of the said compartments is provided with a tube or tubes to supply gas to burners, and the other is provided with a suitable aperture for the admission of air or equivalent gaseous fluid, substantially as and for the purpose described.

2,150.—Cork Hat.—A. Courlander Crondal, New York City. Patented Nov. 8, 1864:

I claim manufacturing coverings for the head of sheets composed of one or more layers of cork and one or more layers of canvas, muslin, or other textile or flexible material, substantially as herein set forth.

2,151.—Lock.—Philo S. Felter, Cincinnatus, N. Y. Patented Dec. 17, 1861:

First, I claim the bar or guard, D, provided with the recess, a, in connection with the notched disks, G, spring, F, provided with the projections, b d d, and the key, H, arranged substantially as and for the purpose herein set forth.

Second, In combination with the subject matter of the above, I claim the employment of numbered or lettered dials, by means of which the lock may be used as a burglar-proof or common lock, as desired, substantially as set forth.

2,152.—Puddling Furnace.—Philip Keenan and Edward O'Connor, West Manchester, Pa. Patented Nov. 14, 1865. Antedated Aug. 26, 1865:

We claim the use of iron ore as a fixing for puddling or boiling furnaces, when mixed with fire clay or other refractory material and used for fixing those portions of the furnace which need protection, without previous melting of the fix.

2,153.—Fix for Puddling Furnaces.—Hugh McDonald, Pittsburgh, Pa, Patented Oct. 17, 1865:

I claim the use of iron ore as a fixing for a puddling or boiling furnace, when applied as a fix to those parts of the furnace which require protection, and so used without previous melting.

Also the use of raw or unmelted iron ore as a fixing for puddling or boiling furnaces, when ground or pulverised and mixed into a pasty mass with water or other suitable liquid.

Also mixing raw iron ore, ground or pulverized with carbonaceous matter and made into a pasty or adhesive mass, and used as a fixing for puddling or boiling furnaces.

2,154.—Thrashing Machine.—Nelson Palmer, Hudson, N. Y. Patented May 16, 1865:

First, I claim the cylinder, h, when constructed as described, for feeding the unthrasbed straw to the thrashing cylinders, as specified.

Second, The guard, g, in combination with the feeding cylinder, h, operating as specified.

Third, The corrugated, ribbed, or granulated thrashing cylinder, b, in combination with a concave or rubber, ribbed, corrugated, or granulated.

Fourth, The lever, d, or its equivalent, in combination with the concave, c, for adjusting the same, as sot forth.

2,155.—Thrashing Machine.—Nelson Palmer, Hudson, N. Y., assignee of P. W. Mills. Patented Jan. 19th, 1858:

First, I claim the thrashing cylinder, D, one end thereof being of greater diameter than the other and provided with ribs of corrugations, as and for the purpose specified.

Second, I claim the concave, E, when so constructed as to fit the cone-shaped thrashing cylinder, D, the parts and sections thereof being made adjustable in relation to each other, in combination with the adjustable concave, F, and apron, B, as and for the purpose specified.

Third, I claim the arrangement of the screws, k s n b, in their relation to the thrashing cylinder, D, and fan wheel, B, and operating as set forth.

2,156.—Horse Rake.—Randal Pratt, Marple Township, Pa. Patented Jan. 8, 1856:

First, I claim the method described of firmly uniting the tooth with the elongated collar, by bending and shrinking the hinging end of the tooth around the collar, substantially as described.

Second, I claim providing the elongated collar with a groove into which the tooth is shrunk, as and for the purpose described.

2,157.—Process for Preserving Eggs.—Richard S. Rhodes and Ebenezer Whyte, Chicago, Ill. Patented Dec. 12, 1865:

We claim as our invention the herein described process for preserving eggs from decay, substantially as herein specified.

5,158.—Coal Oil Lantern.—Sumner Sargent, Watertown, Mass., (assignor through Mesne Assignments to himself, A. P. Knapp, and Edward Miller.) Patented Sept. 17, 1861:

I claim the employment of an aperture, or its equivalents, in the lantern case, through which the shaft or its equivalent of the wick regulator extends, so as to be reached outside of the lantern case, said aperture having a lot or lateral passage leading to it, for the introduction of the said shaft, or equivalent part of the wick regulator into the aperture, and its withdrawal therefrom, in the act of inserting and taking out the lantern lamp, the whole constituting a convenient arrangement for enabling the wick to be regulated outside of the lantern case, and at the same time keeping it closed so as not to disarrange the draught, substantially as and for the purpose herein specified.

In combination with the above, I also claim the plate, M, or its equivalent, for covering and uncovering the passage leading to the regulator aperture in lantern case, as set forth.

I also claim the arrangement and combination of the perforations, t t, in the base flange of the lamp, D, the draught collector, u, division plates, N N, perforated regulating plate, P, and guard cylinder, R, in the manner and for the purposes herein specified.

2,159.—Feed-water Heater and Filterer.—Edwin R. Stillwell, Dayton, Ohio. Patented Oct. 4, 1864:

First, I claim the depositing plates, a a a, constructed and arranged substantially as described and for the purpose specified.

Second, I claim the arrangement of the steam pipes, m and n, with reference to the plates, a a a, substantially as described and for the purposes specified.

Third, I claim the combination of the vessel, A, the plates, a a a, the plate, d, the steam pipes, m n and e, and water pipes, f and r, substantially as described.

2,160.—Feed-water Heater and Filterer.—Edwin R. Stillwell, Dayton, Ohio. Patented Oct. 4, 1864:

First, I claim the overflow box, c, the pipe, b, arranged with reference to the vessel, A, substantially as described and for the purposes specified.

Second, I claim the arrangement of the steam pipe, E, to the overflow box, c, for the purposes set forth.

Notes and Queries

H. N. S., of Mass.—Your plan for carrying cars over mountains by a series of vertical lifts, using the weight of a descending train to aid in the lift, might work in a small model, but would not probably be practicable on a large scale. The preference of Major McNeill and the other West Point engineers who built our first railroads for inchnes so moderate that they could be overcome by the locomotive, has been justified by experience.

F. H. S., of Md.—You ask how many half-inch openings you may make in the steam chest of a ten horse-power steam engine, and still have it work up to ten horse-power. If you mean openings into the air, you cannot have a single one. The loss of steam would vary very materially with the location of the opening, especially if the steam chest was small; if the opening should be made in front of the current of steam and parallel with it, the loss would be greater than if the opening were made at right angles with the current.

E. B. J., of N. Y.—To tin iron, proceed as follows:—Cover the article with dilute sulphuric acid, let it stand a little, and, when clean, plunge into warm water. After this take a liquid made by dissolving a small quantity of zinc in muriatic acid, and wash the articles to be tinned. Plunge immediately into a tin bath, and out of that into hot water. If you wish to anneal the iron, keep the goods in a warm sand bath for some time—not over 400°

G. R. E. asks:—"If an article patented in the United States is manufactured in Canada, or other foreign country, where it is not patented, can the patentee prevent the sale and use of the same in the United States? ANS.—Yes.

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R. McA., of Mass.—You may use your exhaust steam with advantage for drying purposes, provided you exhaust into large pipes, so as to have no more back pressure than you would by exhausting into the open air.

C. B. S. of Conn.—The presence of magnetic iron ore in very large quantities may sometimes cause a deviation of the compass; excepting this there is no instrument that will indicate minerals in the earth. That water may be found by means of witch hazel is one of the delusions of ignorance.

C. E. P. says:—"I wish to correspond with some one who can furnish information in regard to a suitable material for coating the inside of wooden water pipes to render them impervious to water without making the water unwholesome. If a suitable material can be or has been discovered, a large amount will be wanted." Any person having an invention corresponding to the above will do well to advertise the fact in the SCIENTIFIC AMERICAN.

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A. B., of Mass.—We have published twice quite recently F. Grace Calvert's plan for making leather water proof by parafine with a "few per cent" of linseed oil.

C. D. R., of Tenn.—We know of no better materials for paint than linseed oil and zinc white, or linseed oil and white lead.

E. A. A., of R. I.—We should think white zinc paint mixed with varnish, well dried and rubbed down, would answer your purpose.

G. H. A.—We refer you to back numbers of this paper; many heaters for steam boilers are there described.

A. J. S., of Ill.—Tincture of iodine diluted with half its bulk of water is a superior liquid for browning gun barrels.

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Improved Sulky Plow.

This improvement in plows relates to a new method of operating them, whereby they are handled much easier, run lighter, and last longer than common plows.

The improvement is applicable to single or gang plows. In detail, it consists of a beam, A, which is prolonged after it passes the axle, and is attached to the iron, B. This iron connects with the lever, C, so that by pushing it forward, the back end of the plow will be raised clear of the ground. On lowering the lever, the point of the share strikes first, which causes it to set in, no matter how hard the ground. The lever works on a quadrant, D, which is fitted with a catch to hold it at the desired point; an eyebolt in the forward timber, A, furnishes the means to draw the plow. The depth of the plow is regulated by the lever, E, and by reaching down, the driver can set the shares at any point from one to ten inches deep, without stopping. Farmers who have plows that they are pleased with, can attach them to this rigging, when they will work much better than they did before. It is claimed that any boy who can drive is able to manage the machine, and that it is in all respects desirable. For further information, address the inventor, Ira C. Pratt, Morton, Ill., by whom it was patented, through the Scientific Patent Agency, on Sept. 5, 1865.

PRATT'S SULKY PLOW.

JELLIFFE'S BLACKING BOX HOLDER.

"One cannot touch pitch and not be defiled," says the proverb; "or blacking either," the prophet might have added. All those miserable people who polish their own boots frequently find more blacking on their hands than is pleasant or profitable, and this arises from the exceedingly unpleasant action of the box. If you lay it down and rub the brush in, it turns round like a dancing Dervish. If you slap the brush in, the box turns a summersault in the air, and in any case you don't get the blacking out of it.

By the aid of this little device the box can be held very conveniently, without soiling the fingers, and

the paste can be got at without the least difficulty. The arrangement is simply a wooden handle, A, slipped through a band, B, formed by cutting two slits in the bottom of the box itself. The tin between these is pushed down, and the handle shoved in, completely filling the space, and making it all tight. A small hole in the end of the handle is convenient to hang the box up by. This device can be applied at a small cost—"one quarter of one cent," says the inventor—and will doubtless prove popular. For further information address Charles E. L. Jelliffe, Brooklyn, (E. D.,) N. Y., by whom it was patented, through the Scientific American Patent Agency, on Aug. 1, 1865.

The Lake Tunnel---The Wonderful Artesian Wells of Chicago.

The great Lake Tunnel exhibits a favorable state of progression. It has now reached a distance of 4,850 feet from the shore end, and is advancing at the rate of about twelve feet per day on the outer or lake end. The great crib is securely anchored, and three of the six iron cylinders have been successfully sank. It will not be many days before the necessary depth is reached, when workmen will commence excavating toward the shore. While admitting the greatness of the design, and the courage necessary to undertake the execution of so stupendous a project, it is yet quite questionable whether it will ever accomplish the desired object, viz.: A supply of pure wholesome water. Water is now obtained very near the shore, but when the tunnel is completed the inlet will be two miles distant; the complaint now is that the impure waters of the Chicago River—at best a common sewer, and the receptacle of all the filth from the distilleries, factories and packing-houses—finds its way to the pumps, and from thence to the reservoirs. The tunnel, it is said, will obviate this difficulty, but only in a limited degree, for this filthy water will be carried even to the tunnel inlet with every breeze of wind from the west, southwest and south. The opening of the Illinois and Michigan Canal—the work on which is to be commenced this winter, the canal to be cut down to the level of Lake Michigan—will turn the waters of the Chicago River the other way, and, with the current, discharge the filth through the Illinois River. This work will more effectually purify the lake water than all the tunnels which can be built; and this object once accomplished, an inlet to the city water works would be just as good a half mile out in the lake as one two miles distant.

The Artesian wells, now discharging one and a quarter millions of gallons per day of the purest water ever seen on the face of the globe, continue to excite a deal of wonder and curiosity. These wells are located near the city limits—about three miles from the City Hall—are seven hundred feet deep, and discharge an immense volume of clear, cold water.

In several respects these wells are anomalies: first, that the water which rises to the surface stands at 57 degrees Fahrenheit, which is below the mean temperature of the locality, while in all other deep wells the temperature increases in proportion to the descent; so that no water is found at a greater depth at much less than 75 degrees, and in the great wells at Charleston and in the basin at Paris the range is up to 85 and 90 degrees, and then this water is free from the unpleasant and disagreeable mineral taints so common to Artesian wells. It is certified, under chemical analysis, to be the best article of drinking water in the world, and from the force and power with which it comes to the surface—it has a head of one hundred and twenty-five feet above the level of Lake Michigan—there seems to be no doubt but that by an enlargement of one of the wells to the diameter of twenty inches, a sufficient supply—estimated at seventeen millions of gallons per day—could be obtained to meet the demands of the city for years to come, and this would flow into the reservoirs without the aid of expensive engines, steam-pumps and fuel.

Another curious feature in regard to those wells—and one which geologists have not yet explained—is found in the fact that they are located in no great valley or depression, like the basins of Paris and London, but are out on the level prairie, surrounded for hundreds of miles by country of a like character. This fact, taken in connection with the low temperature of the water and the great head of the fountains, seems to indicate that it has a source far in the north or northwest, beyond Lake Superior, and beyond the Mississippi, perhaps away off in the Rocky Mountains, who knows?

We are suffering now from the fish nuisance. Your readers may not know what the fish nuisance is. I will enlighten them. Regularly at about this season of the year small fish, thousands of bushels, gather in the lake about the water inlet, and so clog up the screens that it becomes impossible to pump any water without raising the latter, when in they pour by millions, some living, and find their way into every pipe and out of every faucet. You cannot draw a pitcher of water without your quota of these piscatorial adventurers.—*New York Daily Times.*

THE Committee of the Paris Universal Exhibition of 1867 has just decided that there shall be no lists of admission gratis. The charge will be one franc, except on Friday, when it will be five. Persons who may wish to enter before ten in the morning will pay one franc extra. The price of season tickets will be 100 francs for men, 60 francs for women, and 20 francs for children.

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